

1094

NASA SP-7038(08)

# SIGNIFICANT NASA INVENTIONS

## Available for Licensing in Foreign Countries



(NASA-SP-7038 (08)) SIGNIFICANT NASA INVENTIONS AVAILABLE FOR LICENSING IN FOREIGN COUNTRIES (National Aeronautics and Space Administration) 81 P. MF A01; SOD HC \$5.00 as 033-000-00986-1

N86-26243

Unclas 42905

CSCI 05B 00/82

# SIGNIFICANT NASA INVENTIONS

Available for Licensing  
in Foreign Countries



**Library of Congress Cataloging-in-Publication Data**

**United States. National Aeronautics and Space Administration.**

**Significant NASA inventions available for licensing in foreign countries.**

**(SP ; 7038 (08) (1986)**

**1. Inventions—United States—Catalogs. 2. United States. National Aeronautics and Space Administration.**

**I. Title. II. Series: NASA SP ; 7038 (08).**

**TL521.312.U54 1986 629.4'0973 86-7898**

## **PREFACE**

### **NASA FOREIGN PATENT LICENSING PROGRAM**

#### **GENERAL**

The foreign licensing program of the National Aeronautics and Space Administration serves to promote and utilize foreign patent rights vested in the Administration. The objective of this program is to extend the patent coverage on valuable NASA-owned inventions to various foreign countries in order to further the interests of United States industry in foreign commerce, to enhance the economic interests of the United States, and to advance the international relationships of the United States.

#### **WHERE TO DIRECT INQUIRIES REGARDING INVENTIONS**

Listed in this booklet are abstracts of various NASA-owned inventions which are available for foreign licensing in the identified countries in accordance with the NASA Patent Licensing Regulations, effective July 1, 1981 and published in Vol. 46, No. 211 of the Federal Register 54328-54331, now 14 CFR 1245 et seq., and are reproduced on page 1. Requests for additional information of the invention or information regarding applications for license for a specific invention should be directed to the NASA field installation address printed on the page on which the invention appears. Please be sure to include the title and NASA Case Number of the invention when making your inquiries. Application for a foreign license should be made by following the instructions and completing the questions in the NASA Patent Licensing Regulations.

#### **NEGOTIATION OF LICENSES**

Licenses will be individually negotiated and may be granted to any applicant, foreign or domestic, on a nonexclusive or exclusive basis for royalties or other considerations and on such other terms and conditions as are deemed appropriate to the interests of the United States. Preference in the granting of foreign license rights will be

shown to those applicants who have previously been granted a license under the corresponding U.S. patent or patent application.

### **TO OBTAIN COPIES OF PATENTS**

**This publication includes abstracts of those inventions in which NASA owns the principal or exclusive rights and which have been made available for patent licensing in the countries indicated. The corresponding U.S. patent number is also listed. Copies of the U.S. patents may be purchased directly from the U.S. Patent Office, Washington, D.C. 20231 for one dollar and fifty cents a copy. Some of these inventions have been licensed by NASA in one or more of the indicated countries.**

## CONTENTS

Page

NASA Patent Licensing Regulations.....	xi
NASA Domestic Patent Number Index.....	xvii

### Titles of Invention Abstracts Arranged by Technical Subject Matter

#### AERONAUTICS

Traffic Control System and Method (GSC-10087-1).....	3
Position Location System and Method (GSC-10087-2).....	4
Airfoil Shape for Flight at Subsonic Speeds (Supercritical Wing) (LAR-10585).....	24
Suppression of Flutter (LAR-10682-1).....	26
Improvements for Abating Exhaust Noises in Jet Engines (ARC-10712).....	28
G-Load Measuring and Indicator Apparatus (ARC-10806).....	29
An Annular Wing (NPO-11007-1).....	40
Dual Cycle Aircraft Turbine Engine (LAR-11310-1).....	54
Magnetic Heading Reference (LAR-11387).....	55
Wingtip Vortex Dissipator for Aircraft (LAR-11645).....	61
Alkali-Metal Silicate Binders and Methods of Manufacture (GSC-12303).....	78
Surface Finishing (MSC-12631).....	89
Vortex Generating Flow Passage Design for Increased Film Cooling Effectiveness (LEW-14,039-1).....	130
Warm Fog Dissipation Using Large Volume Water Sprays (MFS-25,962-1).....	162

#### SPACE FLIGHT AND SATELLITES

Apparatus Providing a Directive Field Pattern and Attitude Sensing of a Spin-Stabilized Satellite (XGS-02607).....	1
Gravity Gradient Attitude Control System (GSC-10555).....	23
Water Purification Membranes and Method of Preparation (ARC-10643).....	25
Autonomous Navigation System (ARC-11257-1).....	50
Amplitude Steered Antenna Array (GSC-11446).....	57

#### CHEMISTRY, POLYMERS AND MATERIALS

Fire Resistant Coating Composition (GSC-10072).....	2
Fire Retardant Foams (ARC-10098).....	5
Intumescent Paints (ARC-10099).....	6
Modified Polyisocyanurate Polymer Foam (ARC-10280).....	13
Polymeric Vehicles as Carriers for Sulfonic Acid Salt of Nitrosubstituted Aromatic Amines (ARC-10325).....	14
Potassium Silicate-Zinc Coatings (GSC-10361).....	17
Polyimide Foam for Thermal Insulation and Fire Protection (ARC-10464-1).....	21
Fiber Modified Polyurethane Foam for Ballistic Protection (ARC-10714).....	27

## CONTENTS (Continued)

	Page
Preparation of Dielectric Coatings of Variable Dielectric Constant by Plasma Polymerization (ARC-10892).....	31
Abrasion Resistant Coatings for Plastic Surfaces (ARC-10915).....	32
A Reverse Osmosis Membrane of High Urea Rejection Properties (ARC-10980-1).....	35
Stabilization of Pigments (NPO-11139).....	45
Fibrous Refractory Composite Insulation (ARC-11169-1).....	48
Twisted Multifilament Superconductor (LEW-11726).....	64
Catalytic Trimerization of Aromatic Nitriles and Triaryl-S-Triazine Ring Crosslinked High Temperature Resistant Polymers and Copolymers Made Thereby (LEW-12053-1).....	71
Method of Improving Impact Resistance of Ceramic Bodies, and Improved Bodies (LEW-12301).....	77
Lightweight Electrically-Powered Flexible Laminate (MSC-12662).....	90
Imaging X-Ray Spectrometer (GSC-12,682-1).....	91
Process for Preparing High Temperature Polyimide Film Laminates (LAR-12,742-1).....	94
Method of Fabricating an Imaging X-Ray Spectrometer (GSC-12,956-1).....	100
Polyphenylene Ethers With Imide Linking Groups (LAR-12,980-1).....	102
Advanced Inorganic Separators for Alkaline Batteries and Method of Making (LEW-13,171-1).....	106
Process for Improving Moisture Resistance of Epoxy Resins by Addition of Chromium Ions (LAR-13,226-1).....	107
Process for Improving Mechanical Properties of Epoxy Resins by Addition of Cobalt Ions (LAR-13,230-1).....	108
Hydrogen Rich Gas Generator (NPO-13,342).....	110
A Multitarget Sequential Sputtering Apparatus (NPO-13345).....	111
Process for Preparing Highly Optically Transparent/Colorless Aromatic Polyimide Film (LAR-13,351-1).....	112
Process for Preparing Essentially Colorless Polyimide Film Containing Phenoxy-Linked Diamines (LAR-13,353-1).....	113
Copolyimides With a Combination of Flexibilizing Groups (LAR-13,354-1).....	114
Small, Porous, Polyacrylate Beads (NPO-13383).....	115
System for Minimizing Internal Combustion Engine Pollution Emission (NPO-13402).....	117
Improved Hydrogen-Rich Gas Generator (NPO-13464).....	119
Anti-Fog Composition (MSC-13530-2).....	123
Hydrogen-Rich Gas Generator (NPO-13,560-1).....	125
High Temperature Resistant Cermet and Ceramic Compositions (NPO-13690).....	126
Acoustic Energy Shaping of Suspended Melttable Materials While in the Plaster Shape (NPO-13802).....	127
Arc Spray Fabrication of Metal Matrix Composite Monotape (LEW-13,828-1).....	128
Method of Fluxless Brazing and Diffusion Bonding of Aluminum Containing Components (MSC-14435-1).....	132

<b>CONTENTS (Continued)</b>	<b>Page</b>
Stabilized Unsaturated Polyesters (NPO-16,103-1).....	134
Production of Butanol by Fermentation in the Presence of Cocultures of Clostridium (NPO-16,203-1).....	135
Heat Sealable, Flame and Abrasion Resistant Coated Fabric (MSC-18382-1).....	137
Graphite-Reinforced Aluminum Composite and Method of Preparing the Same (MFS-21077).....	141
Refractory Porcelain Enamel Passive Control Coating for High Temperature Alloys (MFS-22324).....	144
Polyimides of Ether-Linked Aryl Tetracarboxylic Dianhydrides (MFS-22355-1).....	145
Ether-Linked Aryl Tetracarboxylic Dianhydrides (MFS-22356).....	146

### **ELECTRICAL, ELECTRONICS AND COMPUTERS**

Wire Stripper (DFRC-10111).....	7
Unsaturation Saturable Core Transformer (ERC-10125).....	8
Metallic Intrusion Detector System (ARC-10265).....	12
An Electrical Short Locator (ARC-11116-1).....	43
Stored Charge Transistor (NPO-11156-2).....	46
Improved Narrow Band FM System for Voice Communications (GSC-11261-1).....	51
A Method and Apparatus for Operating on Companded PCM Voice Data (KSC-11,285-1).....	53
Millimeter Wave Pumped Parametric Amplifier (GSC-11617).....	59
Electron Beam Controller (LEW-11617-1).....	60
Voltage Controlled Variable Power Divider (GSC-11659).....	62
Connector (LAR-11709).....	63
Dish Antenna Having Switchable Beamwidth (GSC-11760-1).....	66
Two-Dimensional Radiant Energy Array (GSC-11839-1).....	67
Pseudo Continuous Wave Instrument (LAR-12260-1).....	74
Low Intensity X-Ray and Gamma-Ray Imaging Device (GSC-12263).....	75
CDS Solid State Phase Insensitive Ultrasonic Transducer (LAR-12304-1).....	79
Gels as Battery Separators for Soluble Electrode Cells (LEW-12364-1).....	81
Microwave Field Effect Transistor (GSC-12,442-1).....	82
Linear Magnetic Bearing (GSC-12,517-1).....	83
A Linear Magnetic Motor/Generator (GSC-12518-1).....	84
Induction Heating Gun (LAR-12540-1).....	85
Ladder Supported Ring Bar Circuit (LEW-13,570-1).....	86
Linear Magnetic Bearings (GSC-12,582-1).....	87
Low Intensity X-Ray and Gamma-Ray Imaging Spectrometer (GSC-12587-1).....	88
Stirling Cycle Cryogenic Cooler (GSC-12,697-1).....	92
Integrated Photo-Responsive Metal Oxide Semiconductor Circuit (GSC-12,782-1).....	95
High Voltage Isolation Transformer (GSC-12,817-1).....	96



## CONTENTS (Continued)

Page

High Voltage Power Supply (GSC-12,818-1).....	97
Three-Dimensional and Tomographic Imaging Device for X-Ray and Gamma-Ray Emitting Objects (GSC-12,851-1).....	98
Brushless DC Motor With Wound Rotor (NPO-13437).....	118
A Linearized Traveling Wave Amplifier With Hard Limiter Characteristics (NASA Case No. LEW-13,981-1).....	129
Method for Shaping and Aiming Narrow Beams (NPO-14632-1)...	133
Hermetically Sealable Package for Hybrid Solid-State Electronic Devices and the Like (MSC-20,181-1).....	139
Microwave Power Transmission System Wherein Level of Transmitted Power is Controlled by Reflections From Receiver (MFS-21470-1).....	143
Power Factor Control System for AC Induction Motors (MFS-23280-1).....	150
Field Effect Transistor and Method of Construction Thereof (MFS-23312).....	151
Three Phase Power Factor Controller (MFS-25,535-1).....	155
Motor Power Factor Controller With a Reduced Voltage Starter (MFS-25,586-1).....	156
Pulsed Thyristor Trigger Control Circuit (MFS-25,616-1).....	157
Three-Phase Power Factor Controller With Induced EMF Sensing (MFS-25,852-1).....	160
Phase Detector for Three-Phase Power Factor Controller (MFS-25,854-1).....	161

## FLUID MECHANICS AND HEAT TRANSFER

Centrifugal Lyophobic Separator (LAR-10194-1).....	10
Electrostatically Controlled Heat Shutter (NPO-11942).....	68

## INSTRUMENTATION

Method and Apparatus for Measuring the Damping Characteristics of a Structure (ARC-10154).....	9
Electron Microscope Aperture System (ARC-10448).....	19
Automatic Multiple-Sample Applicator and Electrophoresis Apparatus (ARC-10991-1).....	37
Dual Differential Interferometer (LAR-12,966-1).....	101

## ENERGY—INCLUDING SOLAR

Use of Unilluminated Solar Cells as Shunt Diodes for a Solar Array (GSC-10344).....	16
Illumination Control Apparatus for Compensating Solar Light (KSC-11010).....	41
Fabrication of Polycrystalline Solar Cells on Low-Cost Substrates (GSC-12022).....	69
Catalyst Surfaces for the Chromous/Chromic Redox Couple (LEW-13148-1).....	105
High Voltage, High Current Schottky Barrier Solar Cell (NPO-13482-1).....	120

## CONTENTS (Continued)

Page

Thermostatically Controlled Non-Tracking Type Solar Energy Concentrator (NPO-13497).....	122
A Panel for Selectively Absorbing Solar Thermal Energy and the Method of Producing Said Panel (MFS-22562).....	147
A Mount for Continuously Orienting a Collector Dish in a System Adapted to Perform Both Diurnal and Seasonal Solar Tracking (MFS-23267).....	149
Wind Wheel Electric Power Generator (MFS-23515-1).....	153
Amplified Wind Turbine Apparatus (MFS-23830-1).....	154

## MEDICAL AND LIFE SCIENCES

Method for the Repair and Maintenance of Dental Enamel (ERC-10338).....	15
Shoulder Harness and Lap Belt Restraint System (ARC-10519).....	22
Biomedical Ultrasonoscope (ARC-10994-1).....	38
EKG and Ultrasonoscope Display (ARC-10994-2).....	39
Bacterial Adenosine Triphosphate as a Measure of Urinary Tract Infection (GSC-11092-2).....	42
Microelectrophoretic Apparatus and Process (ARC-11121-1).....	44
Spine Immobilization Method and Apparatus (ARC-11167-1).....	47
Visual Accommodation Trainer-Tester (ARC-11,426-1).....	56
Ophthalmic Liquefaction Pump (LEW-12051).....	70
Intra-Ocular Pressure Normalization Technique and Equipment (LEW-12723-1).....	93
Intra-Ocular Pressure Normalization Technique and Equipment (LEW-12955-1).....	99
Ion Beam Sputter-Etched Ventricular Catheter for Hydrocephalus Shunt (LEW-13,107-1).....	104
Modification of the Physical Properties of Freeze-Dried Rice (MSC-13540-1).....	124
Urine Collection Apparatus (MSC-18381-1).....	136
Prosthetic Occlusive Device for an Internal Passageway (MFS-25,740-1).....	158

## PHOTOGRAPHY AND OPTICS

Optical Radiation Frequency Converter and Method (HQN-10818).....	30
Plastic Lens Antireflection Coating (ARC-10983-1).....	36
Method of Post-Process Intensification of Images on Photographic Films and Plates (MFS-23461).....	152
Wide Dynamic Range Video Camera (MFS-25,750-1).....	159
Method and Apparatus for Tensile Testing of Metal Foil (LAR-10208-1).....	11

**CONTENTS (Continued)****Page****MECHANICAL ENGINEERING, TESTING  
AND METAL FORMING**

Expandable Space Frames (ERC-10365).....	18
Totally Confined Explosive Welding (LAR-10941-1).....	34
Explosively Welded Scarf Joint (LAR-11211-1).....	49
Nozzle Extraction Process and Handlemeter for Measuring Handle (LAR-12147).....	73
Free-Piston Regenerative Hot Gas Hydraulic Engine (LEW-12274-1).....	76
Continuous Self-Locking Spiral Wound Seal (LAR-12315-1).....	80
Zero Torque Gear Head Wrench (NPO-13059).....	103
Cooperative Multiaxis Sensor for Teleoperation of Article Manipulating Apparatus (NPO-13386-1).....	116
Variable Friction Secondary Seal for Face Seals (LEW-14,170-1).....	131
Automatic Compression Adjusting Mechanism for Internal Combustion (MSC-18,807-1).....	138
Process and Apparatus for Making Diamonds (MFS-20698).....	140
Method and Apparatus for Non-Destructive Testing (MFS-21233).....	142
Anti-Gravity Device (MFS-22758-1).....	148

**LASERS AND MASERS**

Infrared Tunable Laser (ARC-10463).....	20
Method and Apparatus for Accelerating Chemical Reactions Using a Spread Beam Deflector With Single or Multiple Reflectors (HQN-10941-1).....	33
Long Range Laser Traversing System (GSC-11262-1).....	52
Recorder/Processor Apparatus (GSC-11553).....	58
Dually Mode-Locked Nd: Yag Laser (GSC-11746-1).....	65
Method and Apparatus for Splitting a Beam of Energy (GSC-12083).....	72
Fluorescence Detector for Monitoring Atmospheric Pollutants (NPO-13231).....	109
Reflected-Wave Maser (NPO-13490).....	121

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

## 14 CFR Part 1245

### Licensing of NASA Inventions

**AGENCY:** National Aeronautics and Space Administration.

**ACTION:** Interim regulation with comments requested.

**SUMMARY:** The National Aeronautics and Space Administration (NASA) is revising its patent licensing regulations to conform with Pub. L. 96-517. This interim regulation provides policies and procedures applicable to the licensing of federally owned inventions in the custody of the National Aeronautics and Space Administration, and implements Pub. L. 96-517. The object of this subpart is to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

**EFFECTIVE DATE:** July 1, 1981. Comments must be received in writing by December 2, 1981. Unless a notice is published in the **Federal Register** after the comment period indicating changes to be made, this interim regulation shall become a final regulation.

**ADDRESS:** Mr. John G. Mannix, Director of Patent Licensing, GP-4, NASA, Washington, D.C. 20546.

#### FOR FURTHER INFORMATION CONTACT:

Mr. John G. Mannix, (202) 755-3954.

#### SUPPLEMENTARY INFORMATION:

## PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2 of Part 1245 is revised to read as follows:

\* \* \*

### Subpart 2—Licensing of NASA Inventions

#### Sec.

- 1245.200 Scope of subpart.
- 1245.201 Policy and objective.
- 1245.202 Definitions.
- 1245.203 Authority to grant licenses.

#### Restrictions and Conditions

- 1245.204 All licenses granted under this subpart

#### Types of Licenses

- 1245.205 Nonexclusive licenses
- 1245.206 Exclusive and partially exclusive licenses

#### Procedures

- 1245.207 Application for a license.
- 1245.208 Processing applications
- 1245.209 Notice to Attorney General
- 1245.210 Modification and termination of licenses.
- 1245.211 Appeals
- 1245.212 Protection and administration of inventions
- 1245.213 Transfer of custody
- 1245.214 Confidentiality of information

**Authority:** 35 U.S.C. Section 207 and 208, 94 Stat 3023 and 3024.

\* \* \*

## Subpart 2—Licensing of NASA Inventions

### § 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions, and procedures upon which a NASA invention may be licensed. It does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts; (c) are the result of an authorized exchange of rights in the settlement of patent disputes, or (d) are otherwise authorized by law or treaty.

### § 1245.201 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

### § 1245.202 Definitions.

(a) "Federally owned invention" means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) "Federal agency" means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a Federally owned invention.

(c) "NASA Invention" means a Federally owned invention with respect to which NASA maintains custody and administration, in whole or in part, of the right, title, or interest in such invention on behalf of the United States Government.

(d) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(e) "Practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(f) "United States" means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

### § 1245.203 Authority to grant licenses.

NASA inventions shall be made available for licensing as deemed appropriate in the public interest. NASA may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this subpart on inventions in its custody.

### Restrictions and Conditions

#### § 1245.204 All licenses granted under this subpart.

(a) *Restrictions.* (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) *Conditions.* Licenses shall contain such terms and conditions as NASA determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this subpart. The following terms and conditions apply to any license:

(1) The duration of the license shall be for a period specified in the license agreement, unless sooner terminated in accordance with this subpart.

(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas, or both.

(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of NASA, except to the successor of that part of the licensee's business to which the invention pertains

(4) The license may provide the licensee the right to grant sublicenses under the license, subject to the approval of NASA. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to NASA.

(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted

(7) All licenses shall normally require royalties or other consideration

(8) Where an agreement is obtained pursuant to § 1245.204(a)(2) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:

(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;

(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement; or

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

## Types of Licenses

### § 1245.205 Nonexclusive licenses.

(a) *Availability of licenses.* Nonexclusive licenses may be granted under NASA inventions without publication of availability or notice of a prospective license.

(b) *Conditions.* In addition to the provisions of § 1245.204, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, NASA may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

### § 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on NASA inventions: (i) 3 months after notice of the invention's availability has been announced in the **Federal Register**; or (ii) without such notice where NASA determines that expeditious granting of such a license will best serve the interests of the Federal Government and the public; and (iii) in either situation, specified in (a)(1)(i) or (ii) of this section only if:

(A) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the **Federal Register**, providing opportunity for filing written objections within a 60-day period;

(B) After expiration of the period in § 1245.206(a) (1)(iii)(A) and consideration of any written objections received during the period, NASA has determined that:

(1) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;

(2) The desired practical application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(3) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public, and

(4) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(C) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(D) NASA has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to domestic exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to NASA the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) *Foreign licenses.*

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on a NASA invention covered by a foreign patent, patent application, or other form of protection, provided that:

(i) Notice of a prospective license, identifying the invention and prospective licensee, has been published in the **Federal Register**, providing opportunity for filing written objections within a 60-day period and following consideration of such objections;

(ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced; and

(iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to foreign exclusive and partially exclusive licenses.

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii) The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) *Record of determinations.* NASA shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

## **Procedures**

### **§ 1245.207 Application for a license.**

An application for a license should be addressed to the Patent Counsel at the NASA installation having responsibility for the invention and shall normally include.

(a) Identification of the invention for which the license is desired, including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted,

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of representative of applicant to whom correspondence should be sent,

(e) Nature and type of applicant's business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;

(f) Source of information concerning the availability of a license on the invention,

(g) A statement indicating whether applicant is a small business firm as defined in § 1245.202(c),

(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention; and

(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both,

(i) Identification of licenses previously granted to applicant under Federally owned inventions,

(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially, and

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

#### **§ 1245.208 Processing applications.**

(a) Applications for licenses will be initially reviewed by the Patent Counsel of the NASA installation having responsibility for the invention. The Patent Counsel shall make a preliminary recommendation to the Director of Licensing, NASA Headquarters, whether to: (1) grant the license as requested, (2) grant the license with modification after negotiation with licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the **Federal Register** in accordance with § 1245.206(a)(1)(iii)(A) or § 1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

(c) If the requested license, including any negotiated modification, is denied by the Assistant General Counsel for patent matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with § 1245.211.

#### **§ 1245.209 Notice of Attorney General.**

A copy of the notice provided for in §§ 1245.206(a)(1)(iii)(A), and 1245.206(b)(1)(i) will be sent to the Attorney General.

#### **§ 1245.210 Modification and termination of licenses.**

Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicensee of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.

#### **§ 1245.211 Appeals.**

(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license,

(1) A person whose application for a license has been denied,

(2) A licensee whose license has been modified or terminated, in whole or in part; or

(3) A person who timely filed a written objection in response to the notice required by § 1245.206(a)(1)(iii)(A) or 1245.206(b)(1)(i) and who can demonstrate to the satisfaction of NASA that such person may be damaged by the Agency action.



(b) Written notice of appeal must be filed within 30 days (or such other time as may be authorized for good cause shown) after receiving notice of the adverse decision or determination; including, an adverse decision following the request for reconsideration under § 1245.208(c). The notice of appeal, along with all supporting documentation should be addressed to the Administrator, National Aeronautics and Space Administration, Washington, DC 20546. Should the appeal raise a genuine dispute over material facts, factfinding will be conducted by the NASA Inventions and Contributions Board. The person filing the appeal shall be afforded an opportunity to be heard and to offer evidence in support of the appeal. The Chairperson of the Inventions and Contributions Board shall prepare written findings of fact and transmit them to the Administrator or designee. The decision on the appeal shall be made by the NASA Administrator or designee. There is no further right of administrative appeal from the decision of the Administrator or designee.

**§ 1245.212 Protection and administration of inventions.**

NASA may take any suitable and necessary steps to protect and administer rights to NASA inventions, either directly or through contract.

**§ 1245.213 Transfer of custody.**

NASA having custody of certain Federally owned inventions may transfer custody and administration in whole or in part, to another Federal agency, of the right, title, or interest in any such invention.

**§ 1245.214 Confidentiality of information.**

Title 35, United States Code, section 209, provides that any plan submitted pursuant to § 1245.207(h) and any report required by § 1245.204(b)(6) may be treated by NASA as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

**James M. Beggs,**  
*Administrator*

October 15, 1981

[FR Doc 81-31609 Filed 10-30-81, 8 45 am]

## NASA DOMESTIC PATENT NUMBER INDEX

U S. Patent No	NASA Case No	U S Patent No	NASA Case No
3,341,151	XGS-02607	3,943,763	LAR-11387
3,493,401	GSC-10072	3,952,971	LAR-10585-1
3,495,260	GSC-10087-2	3,953,636	LEW-12301
3,534,367	GSC-10087-1	3,961,997	GSC-12022
3,541,428	ERC-10125		GSC-12023
3,567,155	GSC-10555	3,964,813	LAR-11709
3,620,069	ARC-10154	3,978,417	NPO-13490
3,620,784	GSC-10361	3,382,910	NPO-13560-1
3,632,242	MFS-20698	3,984,070	LAR-11645
3,663,464	ARC-10325	3,996,455	GSC-11839-1
3,672,999	GSC-10344	4,011,854	MFS-23267
3,676,772	ARC-10265-1	4,018,971	LEW-12364-1
3,679,360	ERC-10338	4,032,089	MSC-12631
3,692,533	MSC-13540-1	4,033,119	LAR-11310-1
3,734,432	LAR-10682-1	4,046,720	NPO-13383
3,737,824	LEW-11726-1	4,052,181	NPO-13802
3,745,090	GSC-11092-2	4,052,648	MFS-23280-1
3,753,148	ARC-10463	4,053,918	NPO-13482-1
3,757,476	ERC-10365	4,061,561	ARC-10991-1
3,763,928	NPO-11942	4,061,850	LEW-12053-1
3,764,850	LEW-11617-1	4,072,532	NPO-13690
3,772,216	ARC-10464-1	4,087,902	MFS-23312
3,781,902	GSC-11553	4,093,354	GSC-12083
3,782,177	MFS-21233	4,101,780	MFS-23461
3,795,910	MFS-21470-1	4,103,550	LAR-12147
3,797,098	LAR-10941-1	4,107,363	MSC-12662
3,804,525	GSC-11262-1	4,117,731	LAR-12260-1
3,806,932	GSC-11446	4,117,749	DFRC-10111
3,828,524	LAR-10194-1	4,122,334	KSC-11010
3,830,431	ARC-10712	4,130,471	ARC-11121-1
3,833,857	GSC-11617	4,132,829	ARC-10892
3,842,485	LAR-11211-1	4,137,365	ARC-10915
3,847,652	ARC-10643	4,142,101	GSC-12263
3,847,689	ARC-10448-1	4,148,962	ARC-11169-1
3,856,534	MSC-13530-2	4,154,230	ARC-10994-2
3,864,239	NPO-13345-1	4,156,304	ARC-10994-1
3,866,233	GSC-11760-1	4,157,718	LEW-12955-1
3,869,680	GSC-11746-1	4,162,169	GSC-12303
3,876,939	GSC-11261-1	4,184,491	LEW-12723-1
3,887,233	ARC-10519	4,191,505	MFS-23515-1
3,888,362	NPO-13386-1	4,192,910	LEW-13148-1
3,895,521	ARC-10806-1	4,195,244	LAR-12304-1
3,899,517	MFS-22356	4,199,448	ARC-10980-1
3,891,452	MFS-22324	4,215,548	LEW-12274-1
3,894,677	MFS-21077	4,218,685	MSC-16800-1
3,891,848	NPO-13231	4,244,215	ARC-11257-1
3,906,296	NPO-11156-2	4,261,349	ARC-11167-1
3,906,913	NPO-13402	4,270,539	MSC-18381-1
3,906,954	LEW-12051	4,271,347	HQN-10941-1
3,915,148	NPO-13497	4,282,479	ARC-11116-1
3,916,060	ARC-10714	4,284,682	MSC-18382-1
3,920,413	MFS-22562	4,287,578	NPO-14632-1
3,920,416	NPO-13464-1	4,309,039	LAR-12315-1
3,925,312	MFS-22355-1	4,315,197	GSC-12518-1
3,937,387	MSC-14435-1	4,331,746	LEW-13171-1
3,938,373	LAR-10208-1	4,345,153	GSC-12587-1
3,942,298	NPO-13059		

## NASA DOMESTIC PATENT NUMBER INDEX (CONTINUED)

U.S. Patent No.	NASA Case No.
4,377,169.....	LEW-13,107-1
4,387,935.....	GSC-12,517-1
4,389,849.....	GSC-12,697-1
4,404,511.....	MFS-25,586-1
4,406,256.....	MSC-18,807-1
4,408,597.....	MFS-25,740-1
4,422,012.....	LEW-13,570-1
4,426,614.....	MFS-25,616-1
4,433,276.....	MFS-25,535-1
4,444,979.....	LAR-12,980-1
4,459,528.....	MFS-25,854-1
4,469,998.....	MFS-25,852-1
4,472,728.....	GSC-12,682-1
4,473,259.....	GSC-12,582-1
4,473,674.....	LAR-13,230-1
4,510,277.....	LAR-13,226-1
4,510,476.....	GSC-12,817-1
4,512,661.....	LAR-12,966-1
4,517,472.....	GSC-12,818-1
4,518,625.....	LEW-13,828-1
4,521,659.....	LAR-12,540-1
4,521,688.....	GSC-12,851-1
4,523,008.....	NPO-16,103-1
4,529,358.....	LEW-14,039-1
4,539,293.....	NPO-16,203-1
4,543,295.....	LAR-12,742-1
4,546,248.....	MFS-25,750-1
4,564,898.....	LEW-13,981-1

# APPARATUS PROVIDING A DIRECTIVE FIELD PATTERN AND ATTITUDE SENSING OF A SPIN-STABILIZED SATELLITE

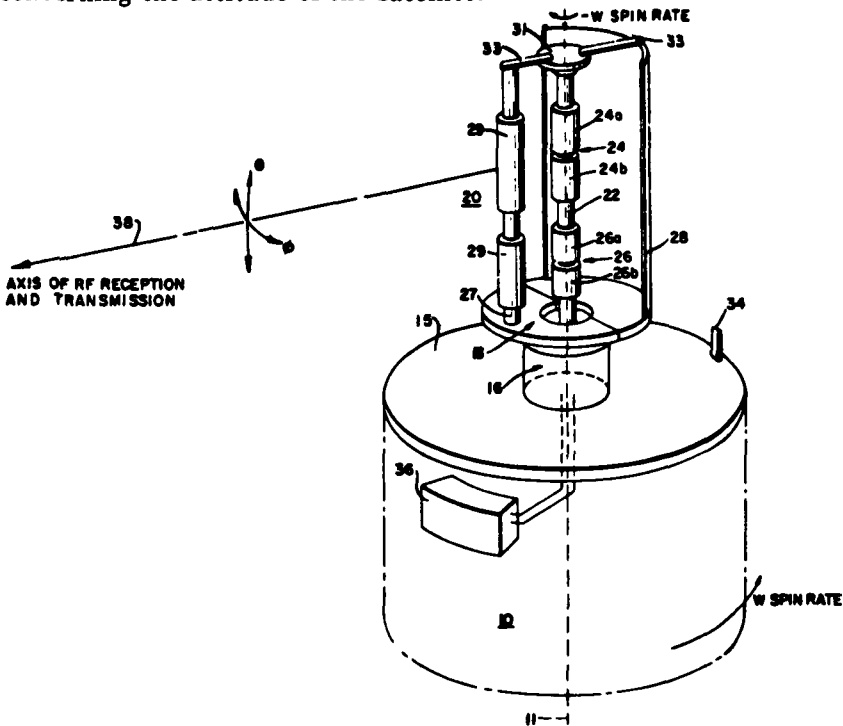
NASA Case No. XGS-02607  
 Inventor: Abe Kampinsky  
 Canada

Address inquiries to:  
 Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

Corresponding to U.S. Patent No. 3,341,151

Filed 7-23-65  
 Issued 9-12-67

A satellite, adapted to spin about an axis, having antenna elements for communicating with a remote body and a beam collimator rotatable with respect to the spin axis. The beam collimator is rotated at the same rate and in the opposite direction as the spin of the satellite to provide a directional beam stationary in space. Ejection apparatus enables the collimator to be jettisoned in event of rotational malfunction so that an omnidirectional beam may be provided about the spin axis. Signal processing circuitry operating in conjunction with the antenna elements provides information concerning the attitude of the satellite.



## FIRE RESISTANT COATING COMPOSITION

NASA Case No. GSC-10072  
Inventor: John B. Schutt, et al.  
Canada

*Address inquiries to:*  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

*Corresponding to U.S. Patent No. 3,493,401*

*Filed 11-28-67  
Issued 2-3-70*

Fire resistant coating compositions intended for high temperature applications, which when dried are flake, crack, craze, and abrasion resistant and of greatly reduced leachability. The compositions, which are combinable with selected conventional pigments and fillers, comprise a combination of a potassium silicate solution, ceric oxide, and/or alkyl trialkoxy silane as rehydration suppressants, and wollastonite as a film builder.

## TRAFFIC CONTROL SYSTEM AND METHOD

NASA Case No. GSC-10087-1  
Inventor: Charles R. Laughlin  
Canada

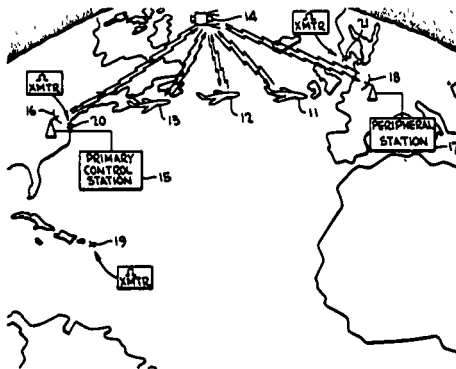
Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,534,367

Filed 1-30-68  
Issued 1-17-69

System and method for position locating, deriving centralized air traffic control, data, and communicating via voice and digital signals between a multiplicity of remote aircraft (including supersonic transports) and a central station, as well as a peripheral ground station(s), through a synchronous satellite relay station. Side tone ranging patterns, as well as digital and voice signals are modulated on a carrier transmitted from the central station and received on all of the supersonic transports. Each aircraft communicates with the ground stations via a different frequency multiplexed spectrum. Supersonic transport position is derived from a computer at the central station and supplied to a local air traffic controller. Position is determined in response to variable phase information imposed on the side tones at the aircraft, and relayed back to the transports. Common to all of the side tone techniques is Doppler compensation for the supersonic transport velocity.

The patent coverage of GSC-10087-1 is directed to transmitting a first side tone spectrum from a first point, transmitting a carrier modulating with a second side tone spectrum from a second point, receiving the first and second spectrums on an aircraft, determining from the phase of the tones the distance of the aircraft relative with the first and second points, determining the distance of the aircraft from the center of the Earth, and then combining the three distances to establish the location of the aircraft.



## POSITION LOCATION SYSTEM AND METHOD

NASA Case No. GSC-10087-2  
Inventor: Charles R. Laughlin, et al.  
Canada

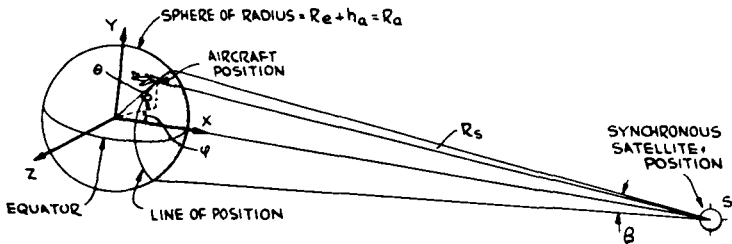
Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,495,260

Filed 1-30-68  
Issued 2-10-70

System and method for position locating, deriving centralized air traffic control data, and communicating via voice and digital signals between a multiplicity of remote aircraft (including supersonic transports) and a central station, as well as a peripheral ground station(s), through a synchronous satellite relay station. Side tone ranging patterns, as well as digital and voice signals are modulated on a carrier transmitted from the central station and received on all of the supersonic transports. Each aircraft communicates with the ground stations via a different frequency multiplexed spectrum. Supersonic transport position is derived from a computer at the central station and supplied to a local air traffic controller. Position is determined in response to variable phase information imposed on the side tones at the aircraft, and relayed back to the transports. Common to all of the side tone techniques is Doppler compensation for the supersonic transport velocity.

The claim coverage of GSC-10087-2 varies in at least one respect in that the Doppler frequency shift on the carrier is utilized to provide a determination of the velocity of the object relative to a satellite station.



## FIRE RETARDANT FOAMS

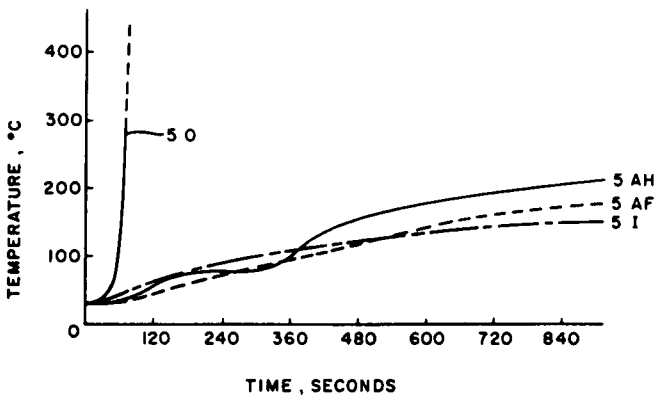
NASA Case No. ARC-10098  
Inventor: John A. Parker, et al.  
Canada

\*See address below.

Corresponding to U.S. Patent No. 3,549,564

Filed 2-5-68  
Issued 12-22-70

This invention improves upon polyurethane foams as fire resistant materials by improving their characteristics and by imparting fire suppressant and fire retardant characteristics. The main structure of the material is a rigid or semi-rigid polyurethane foam, preferably of a highly branched structure, in which are incorporated one or more materials to impart special properties. Modified foams have been developed which provide effective protection for thermally sensitive structures against the destructive action of fuel-fires. The invention relates to the modification of closed cell rigid and semi-rigid polyurethane foams in the density range of from 0.50 to 50 pounds per cubic foot. The modifying agents include three types: a certain class of alkyl halide resins, a certain class of inorganic salts, and encapsulated halogen bearing volatile molecules. The modified foam may then be applied by conventional methods. Outstanding protection against fire has been achieved.



\*Exclusively licensed to Avco Corporation. Please direct inquiries to: Fire Protection Materials, Avco Corporation, Avco Systems Division, Lowell Industrial Park, Lowell, Massachusetts 01851.



## INTUMESCENT PAINTS

NASA Case No. ARC-10099  
Inventor: John A. Parker, et al.  
Canada

\*See address below.

*Corresponding to U.S. Patent No. 3,535,130*

*Filed 2-9-68  
Issued 10-20-70*

Intumescent (swelling or expanding) paints useful for fire protection have been produced. Conventional intumescent paints suffer from many disadvantages including sensitivity to water and other solvents, little resistance to scuffing and abrasion, sensitivity to thermal erosion by flames, and limited efficiency in the protection of substrates under thin steel plate or sheet. This paint overcomes these disadvantages and provides outstanding protection. The intumescent material is an aromatic nitroamino compound in the form of its sulfate, either dissolved or dispersed in a vehicle, or prepolymerized, or both. Upon heating, such a paint intumesces, chars and provides a flame resistant coating.

\*Exclusively licensed to Avco Corporation. Please direct inquiries to: Fire Protection Materials, Avco Corporation, Avco Systems Division, Lowell Industrial Park, Lowell, Massachusetts 01851.

# WIRE STRIPPER

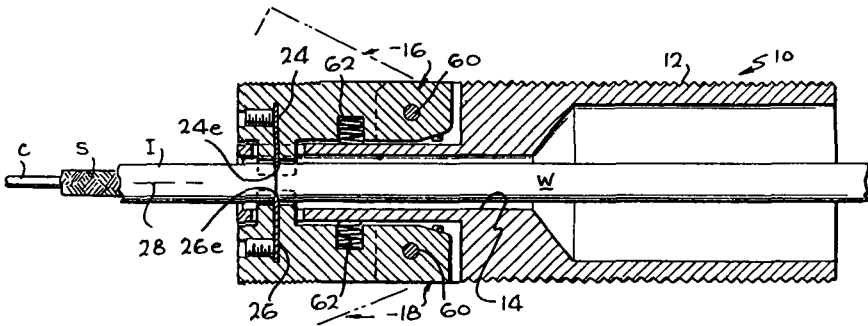
NASA Case No. DFRC-10111  
Inventor: Merle A. Economu  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 4,117,749

Filed 8-9-76  
Issued 10-3-78

An insulation stripper is described which is especially useful for shielded wire, the stripper including a first pair of jaws with blades extending substantially perpendicular to the axis of the wire, and a second pair of jaws with blades extending substantially parallel to the axis of the wire. The first pair of jaws is pressed against the wire so the blades thereof cut into the insulation, and the device is turned to form circumferential cuts in the insulation. Then the second pair of jaws is pressed against the wire so the blades thereof cut into the insulation, and the wire is moved through the device to form longitudinal cuts that permit easy removal of the insulation. Each of the blades is located within the concave face of a V-block, to center the blades on the wire and to limit the depth of blade penetration.



# UNSATURATING SATURABLE CORE TRANSFORMER

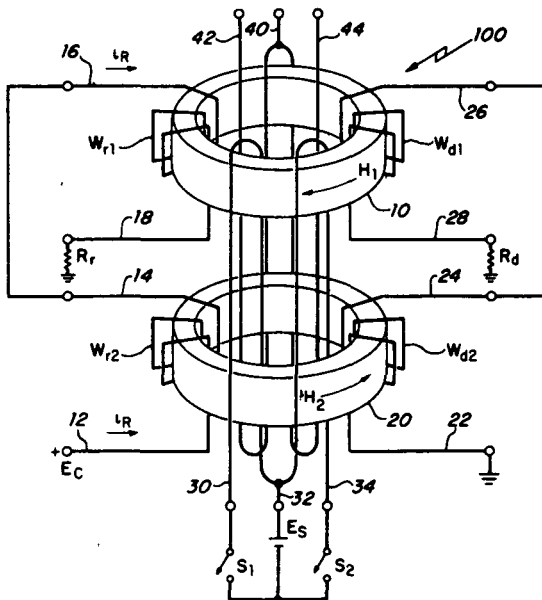
NASA Case No. ERC-10125  
 Inventor: Francisc C. Schwarz  
 Canada

Address inquiries to:  
 NASA Headquarters  
 Mail Code: GP-4  
 Washington, D.C. 20546  
 U.S.A.

Corresponding U.S. Patent No. 3,541,428

Filed 11-4-68  
 Issued 11-17-70

The transformer of the present invention will not saturate at any time under any conditions for any length of time. The device includes a pair of stacked, uncut, saturable magnetic cores having a plurality of windings. The cores operate in parallel and provide a means of detecting, warning and suppressing any impending saturation before saturation can occur. Many advantages are gained from the use of this transformer such as: elimination of the main apparent cause of power transistor failure in inverter circuits while enabling existing power transistors to process double or more load current, and, enabling a better utilization of existing components because it reduces the need to derate switching components to a small fraction of their current carrying capacity.



# METHOD AND APPARATUS FOR MEASURING THE DAMPING CHARACTERISTICS OF A STRUCTURE

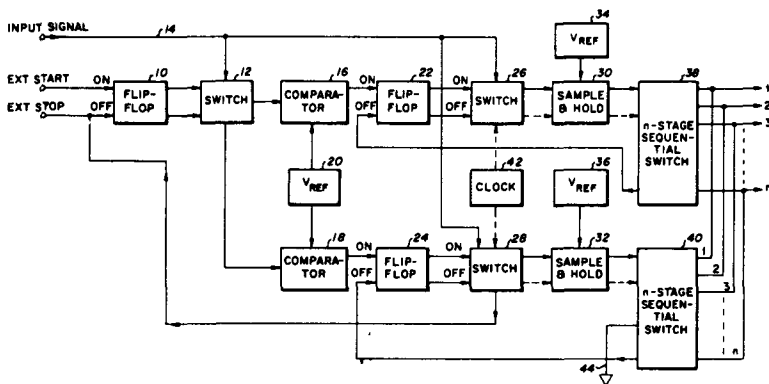
NASA Case No. ARC-10154  
 Inventor: Henry A. Cole, Jr.  
 Canada, \* Japan

Address inquiries to:  
 Ames Research Center  
 Attn: Patent Counsel  
 Mail Code: 200-11A  
 Moffett Field, CA 94035  
 U.S.A.

Corresponding to U.S. Patent No. 3,620,069

Filed 1-24-69  
 Issued 11-16-71

Spectral analyzers and correlation computers have been used in the past to provide the most useful damping data heretofore available; however, these types of apparatus either require too much time to obtain accurate values of damping characteristics or can only be used with linear systems. The present invention relates to an automatic on-the-line instrument for measuring the damping characteristics of a structure or system during excitation by random forces or influences. The apparatus is comprised of at least two parallel sampling circuits which perform time sequential sampling operations on predetermined portions of a given input signal. After summing the outputs of the sampling circuits at output terminals, a sampling transient indicative of a point on the damping characteristic of the structure can be obtained.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 21 for address. All other foreign patent rights available from NASA.

## CENTRIFUGAL LYOPHOBIC SEPARATOR

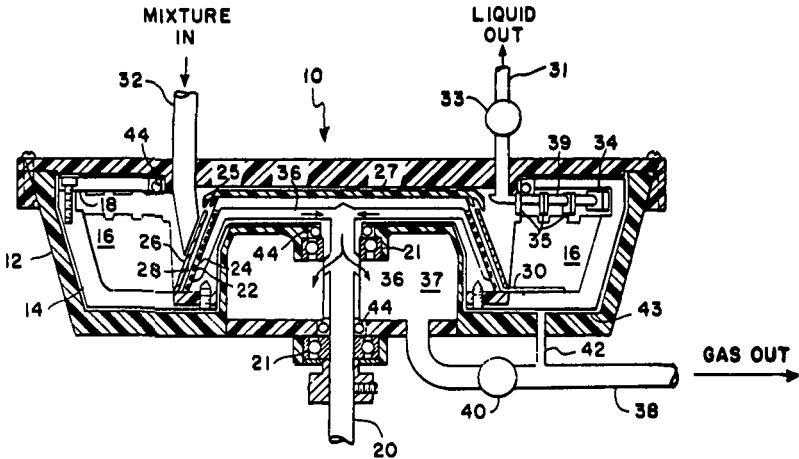
NASA Case No. LAR-10194-1  
Inventor: Franklin W. Booth, et al.  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 3,828,524

Filed 8-9-71  
Issued 8-13-74

This is a centrifugal separator for the separation of aerosols from a mixed stream of gas and liquid. The invention utilizes both centrifugal force and a lyophobic filter, the combination of which presents several advantages. This invention relates to a centrifugal separator and more particularly to a separator of aerosols from a mixed stream of gas and liquid utilizing both centrifugal force and a lyophobic filter. The use of lyophobic filters to separate liquid aerosols from a gas stream is known in the art. Using both lyophobic filtration and centrifugal force however, has several advantages over the use of either method of separation by itself.



# METHOD AND APPARATUS FOR TENSILE TESTING OF METAL FOIL

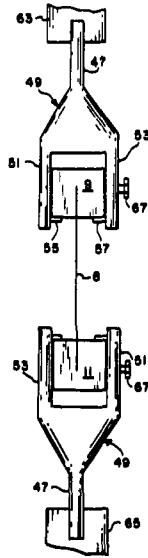
NASA Case No. LAR-10208-1  
Inventor: Orval Wayne Wade  
Canada, Japan

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 3,938,373

Filed 6-27-74  
Issued 2-17-76

In the strength of material testing of any specimen the ultimate goal is the acquisition of accurate and reproducible results. This invention is an improved method for the tensile testing of metal foil specimens and to an aligning apparatus for use in the method. Accurate, reproducible results in the tensile testing of thin metal foils are obtained by a method which comprises, before placing the test specimen in a tensile testing machine, working the side edges of the test specimen until the edges are parallel and flaw-free.



# METALLIC INTRUSION DETECTOR SYSTEM

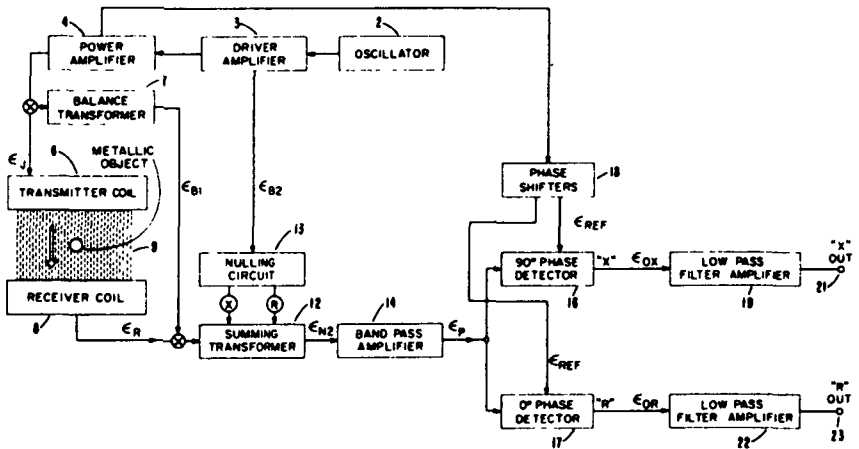
NASA Case No. ARC-10265-1  
 Inventor: Robert D. Lee  
 Canada

Address inquiries to:  
 Ames Research Center  
 Attn: Patent Counsel  
 Mail Code: 200-11A  
 Moffett Field, CA 94035  
 U.S.A.

Corresponding to U.S. Patent No. 3,676,772

Filed 8-18-70  
 Issued 7-11-72

A system is described for determining the intrusion, relative size, and the physical characteristics of a metallic object in a predetermined space. Transmitter and receiver coil assemblies are arranged to define a space through which a metallic object is expected to pass. The assemblies are adapted to generate an electromagnetic field of predetermined energy per unit volume, with the receiver coil coupled to the energy source to indicate the intrusion of a metallic object into the electromagnetic field, whether the object is ferrous or nonferrous, and the size of the object.



## MODIFIED POLYISOCYANURATE POLYMER FOAM

NASA Case No. ARC-10280  
Inventor: Salvatore R. Riccitiello, et al.  
Canada

\*See address below.

*No Patent in U.S.*

The subject matter of this invention is directed to a fire retardant polyisocyanurate foam which is resistant to high temperatures and which has exceptional dimensional stability. In general, the present invention is carried out by reacting an organic polyisocyanate in the presence of a blowing agent and catalyst with a low hydroxyl number, high molecular weight linear polyether polyol comprising a condensation product of a multi-functional polyol and propylene oxide with grafted polyacrylonitrile branched side chains. Thus the crux of the present invention is the employment of a polyol having grafted acrylonitrile side chains which cyclize at elevated temperatures to form stable heterocyclic structures. By employing the polyol having a high molecular weight and low hydroxyl number, only small amounts of the isocyanate groups are consumed to form urethane linkages.

\*Exclusively licensed to Avco Corporation. Please direct inquiries to: Fire Protection Materials, Avco Corporation, Avco Systems Division, Lowell Industrial Park, Lowell, Massachusetts 01851.



**POLYMERIC VEHICLES AS CARRIERS FOR  
SULFONIC ACID SALT OF NITROSUBSTITUTED  
AROMATIC AMINES**

**NASA Case No ARC-10325  
Inventor: Paul M. Sawko  
Canada**

**\*See address below.**

*Corresponding to U.S. Patent No. 3,663,464*

*Filed 8-13-70  
Issued 5-16-72*

Intumescent coatings when applied to the surface of an article provide protection from fire and heat. Many applications of the coatings (or paints) are envisioned which include use in schools, homes, office buildings, ships, spacecraft, aircraft, etc. This invention relates to an intumescent agent which contains the ammonium salt of 4-nitroaniline-2 sulfonic acid and a polymer of the mercaptan type which may contain disulfide linkages or polyoxyalkylene linkages. The adhesion and char resistance of such compositions can be further improved by the addition of epoxy resins. The composition exhibits high hydrolytic stability.

**\*Exclusively licensed to Avco Corporation. Please direct inquiries to: Fire Protection Materials, Avco Corporation, Avco Systems Division, Lowell Industrial Park, Lowell, Massachusetts 01851.**

**METHOD FOR THE REPAIR AND MAINTENANCE  
OF DENTAL ENAMEL**

**NASA Case No. ERC-10338**  
**Inventor: Bernard Rubin, et al.**  
**Canada**

*Address inquiries to:*  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent No. 3,679,360*

*Filed 6-26-70*  
*Issued 7-25-72*

A process for the preparation of calcium phosphate salts wherein a calcium phosphate salt is deposited from a gel medium onto the surface of a tooth. The use of the gel diffusion process to deposit the constituents of tooth enamel onto the surface of a weak or damaged tooth and thereby effect repair of the tooth is disclosed.

# USE OF UNILLUMINATED SOLAR CELLS AS SHUNT DIODES FOR A SOLAR ARRAY

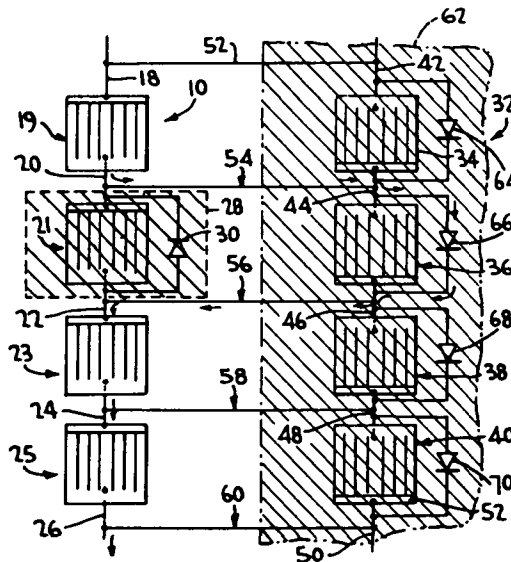
**NASA Case No. GSC-10344**  
**Inventor: Anthony J. Barbera**  
**Canada**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 3,672,999*

*Filed 12-19-68*  
*Issued 6-27-72*

An improvement has been made in the electrical interconnection of solar cells in an array of solar batteries. Each individual cell of a shaded battery is electrically connected in parallel with a corresponding cell of an illuminated solar battery. The p-n junction solar cell of the shaded battery provides a forward biased diode equivalent in a by-pass conducting path around the corresponding illuminated cell in the event it becomes non-conductive. Thus, uninterrupted current flow is maintained in the event the illuminated cell fails to function.



## POTASSIUM SILICATE-ZINC COATINGS

NASA Case No. GSC-10361  
Inventor: John B. Schutt  
Canada, France,  
Japan, Great Britain,  
West Germany

*Address inquiries to:*  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

*Corresponding to U.S. Patent No. 3,620,784*

*Filed 1-24-68  
Issued 11-16-71*

Zinc dust coatings which, when dried on a metal surface, are crack, craze, and abrasion resistant. The coatings are formed by combining a potassium silicate solution with zinc dust and, optionally, including an alkyl trialkoxysilane. These compositions of basically inorganic materials are intended primarily for the protection of metals subject to adverse environmental conditions.

## EXPANDABLE SPACE FRAMES

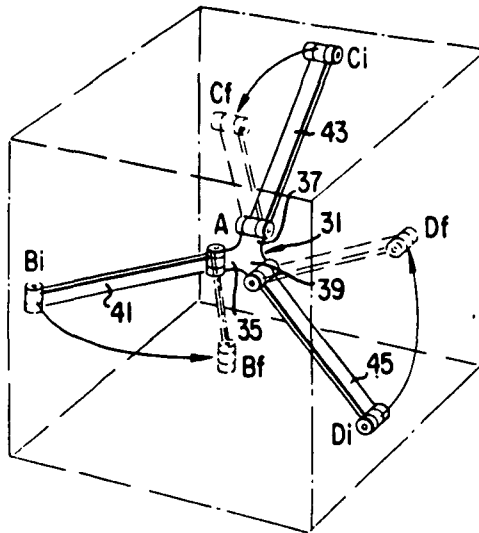
NASA Case No. ERC-10365  
Inventor: Alan H. Schoen  
Argentina, Canada, Japan

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91108  
U.S.A.

Corresponding to U.S. Patent No. 3,757,476

Filed 12-17-70  
Issued 9-11-73

Expandable space-frames formed of a plurality of hinge joint assemblies and struts are reported in this invention. The space-frames are utilized in various types of structures. They can form a basic building structure or can be utilized in a planar manner to form the floors and walls of a structure. They can be utilized in space to define a structure such as a manned orbiting laboratory.



## ELECTRON MICROSCOPE APERTURE SYSTEM

NASA Case No. ARC-10448-1  
Inventor: Klaus Heinemann  
Canada, \* Japan

*Address inquiries to:*  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

*Corresponding to U.S. Patent No. 3,847,689*

*Filed 1-28-72  
Issued 11-12-74*

An electron microscope is described, which includes an electron source, a condenser lens having either a circular aperture for focusing a solid cone of electrons onto a specimen or an annular aperture for focusing a hollow cone of electrons onto the specimen, and an objective lens with an annular objective aperture, for focusing electrons passing through the specimen onto an image plane. The invention also entails a method of making the annular objective aperture, using electron imaging, electrolytic deposition, and ion etching techniques.

\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

## INFRARED TUNABLE LASER

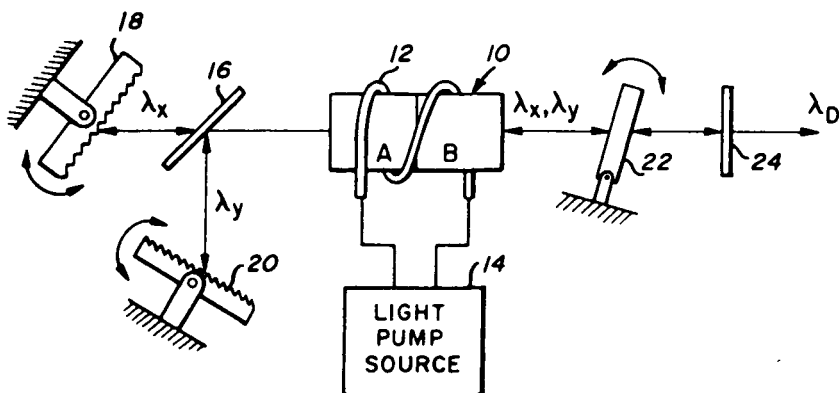
NASA Case No. ARC-10463  
Inventor: Kenneth W. Billman  
Canada, \* Japan

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 3,753,148

Filed 4-6-72  
Issued 8-14-73

The invention relates to laser apparatus for providing an intense source of coherent laser radiation which is tunable from the visible wavelengths through the infrared wavelengths. It can be used in absorption spectroscopy and in the detection and monitoring of pollution in the atmosphere. Selected radiation of the tunable laser is passed through the non-linear mixing crystal causing it to develop radiation of a third wavelength which is transmitted out of the optical cavity through the third reflector.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**POLYIMIDE FOAM FOR THERMAL INSULATION  
AND FIRE PROTECTION**

**NASA Case No. ARC-10464-1  
Inventor: Robert William Rosser  
Canada, \* Japan**

*Address inquiries to:*  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

*Corresponding to U.S. Patent No. 3,772,216*

*Filed 11-12-71  
Issued 11-13-73*

In the preparation of polyimide foams by the reaction of polyisocyanates and polyfunctional aromatic acid derivatives, flame retardant foamed products of improved cell quality, friability, and resiliency are obtained by conducting the reaction in the presence of an alkanolamine, such as 1-hydroxyethyl-2heptadecenyl glyoxalidine. Another aspect of the invention resides in the finding that polyimide foams of reproducible density above 1 lb/cu ft and below 6 lbs/cu ft can be obtained by, employing in the reaction at least 2% by weight of siloxane-glycol copolymer as a surfactant which acts as a specific density control agent. A further feature of the invention is the production of polyimide foams into which reinforcing fibers such as silicon dioxide and carbon fibers may be incorporated.

\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. Please direct inquiries for manufacturing license in Japan to:

Japan Engineering Development Company  
Room #1004; TBR Bldg.  
No. 10-2, 2-chome  
Nagata-Cho, Chiyoda-ku  
Tokyo, Japan 100

All other foreign patent rights available from NASA.



## SHOULDER HARNESS AND LAP BELT RESTRAINT SYSTEM

NASA Case No. ARC-10519

Inventor: Albert P. Garavablia, et al.  
Canada, Japan

Address inquiries to:

Ames Research Center

Attn: Patent Counsel

Mail Code: 200-11A

Moffett Field, CA 94035

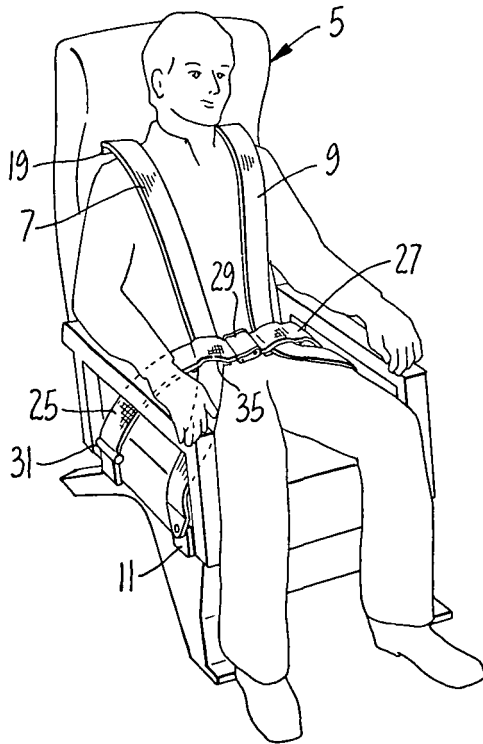
U.S.A.

Corresponding to U.S. Patent No. 3,887,233

Filed 8-22-72

Issued 6-3-75

The present invention provides a shoulder harness which is held by inertia reels so that the user is not unduly restrained and can freely move about, yet the reels will instantly lock when the user is subjected to deceleration forces. The shoulder straps preferably pass through openings in the seat itself so that they are substantially at shoulder height and there is little chance of the straps slipping off of the shoulders. The combined restraint of the present invention provides for slippage between the lap belt and the shoulder straps so that it readily adapts itself to users of different sizes.



# GRAVITY GRADIENT ATTITUDE CONTROL SYSTEM

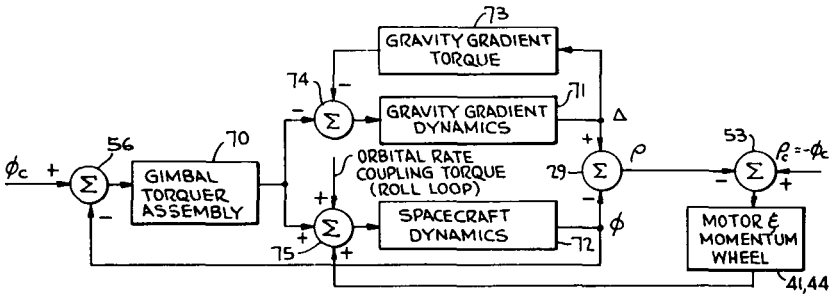
NASA Case No. GSC-10555  
 Inventor: James A. Gatlin, et al.  
 Canada

Address inquiries to:  
 Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

Corresponding to U.S. Patent No. 3,567,155

Filed 12-20-68  
 Issued 3-2-71

A system for controlling and stabilizing the attitude of an artificial earth satellite includes a gravity gradient member mounted in a gimbal arrangement to have two degrees of freedom. The angular deviation of the gravity gradient member and the satellite relative to the local vertical and the spacecraft angle command input signal selectively drive a plurality of inertial momentum wheels, one for each of the three spacecraft axes, provided to dampen the gravity gradient member librations. The gravity gradient member is controlled so that the equilibrium position of the longitudinal axis thereof is maintained in alignment with the local vertical in response to signals indicative of the rate of change of movement thereof with respect to the remainder of the satellite and a signal indicative of the angular deviation of the satellite position from the angle command.



# AIRFOIL SHAPE FOR FLIGHT AT SUBSONIC SPEEDS

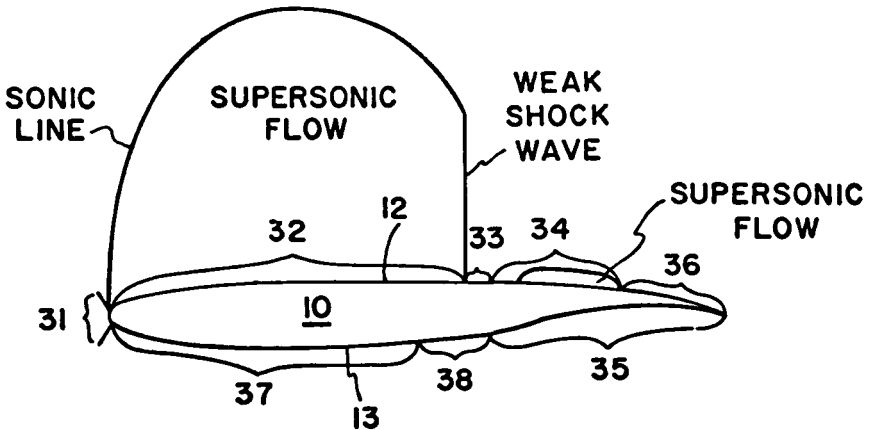
NASA Case No. LAR-10585-1  
Inventor: Richard T. Whitcomb  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 3,952,971  
(Supercritical Wing)

Filed 11-9-71  
Issued 4-27-76

This invention relates to an airfoil for an aircraft and more particularly to an airfoil with a design Mach number in the range .7 to 1.0 and having an upper surface designed to delay shock wave induced boundary layer separation until high subsonic Mach numbers well above the critical Mach number are reached. The airfoil has an upper surface shaped to control flow accelerations and pressure distribution over the upper surface and prevents separation of the boundary layer due to shock wave formulation at high subsonic speeds well above the critical Mach number. A highly cambered trailing edge section improves overall airfoil lifting efficiency. This airfoil is known as the supercritical wing.



# WATER PURIFICATION MEMBRANES AND METHOD OF PREPARATION

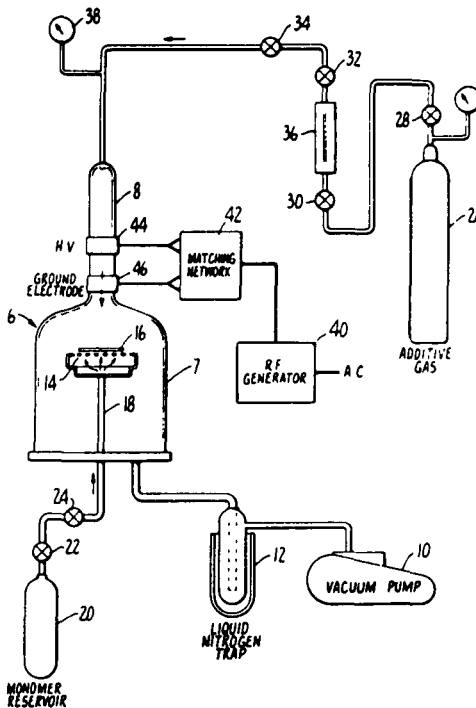
NASA Case No. ARC-10643  
Inventor: John R. Hollahan, et al.  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 3,847,652

Filed 12-8-72  
Issued 11-12-74

Reverse osmosis membrane technology has grown dramatically in recent years for the production of fresh water and is particularly important in the purification and reuse of water in space missions. The present invention contemplates the fabrication of membranes of allyl amine as thin films in the presence of a plasma discharge. The membranes are superior in that they do not have to be stored in pure H<sub>2</sub>O, demonstrate salt rejection rates of 95% or more, do not compress under use, are formed without pinholes, and in any desired configuration, and, possess high adhesion on a variety of substrates.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

## SUPPRESSION OF FLUTTER

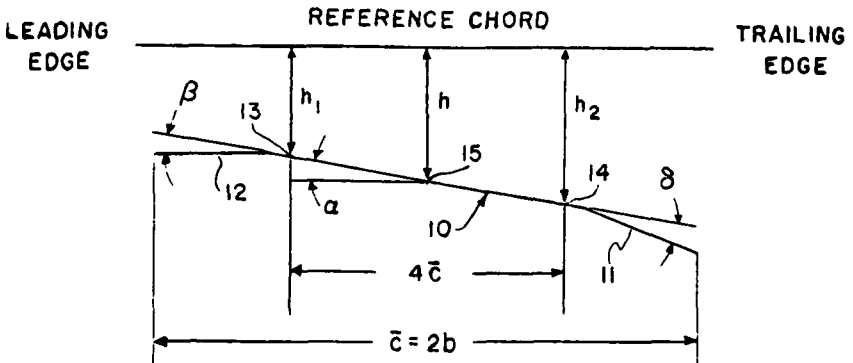
NASA Case No. LAR-10682-1  
Inventor: Eliahu Nissim  
Japan, Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 3,734,432

Filed 3-25-71  
Issued 5-22-73

An active aerodynamic control system is described for controlling flutter over a large range of oscillatory frequencies unaffected by mass, stiffness, elastic axis, or center of gravity location of the system, mode of vibration, or subsonic Mach number. It consists of one or more pairs of leading edge and trailing edge, hinged or deformable control surfaces, each pair operated in concert by a stability augmentation system. Torsion and bending motions or deflections of the fluttering member are sensed and converted by the stability augmentation system into leading and trailing edge control surface deflections which produce lift forces and pitching moments to suppress flutter.



**FIBER MODIFIED POLYURETHANE FOAM  
FOR BALLISTIC PROTECTION**

NASA Case No. ARC-10714  
Inventor: Richard H. Fish, et al.  
Canada, Japan

\*See address below.

*Corresponding to U.S. Patent No. 3,916,060*

*Filed 10-7-14  
Issued 10-28-75*

The closed cell, semi-rigid, fiber-loaded self extinguishing foam of the present invention has properties of retarding penetration of incendiary ballistics, prevention of fire in the void spaces of the aircraft, providing support for the fuel cell, and strengthening the aircraft frame. The foam is based on a polyurethane resin and is filled with fibers and contains a fire retardant material. It does not produce noxious fumes when heated and the strength of the foam is enhanced by the fibers being oriented parallel to the surface of the substrate on which the foam is sprayed.

\*Exclusively licensed to AVCO Corporation. Please direct inquiries to: Fire Protection Materials, AVCO Corporation, AVCO Systems Division, Lowell Industrial Park, Lowell, Massachusetts, 01851, U.S.A.

# IMPROVEMENTS FOR ABATING EXHAUST NOISES IN JET ENGINES

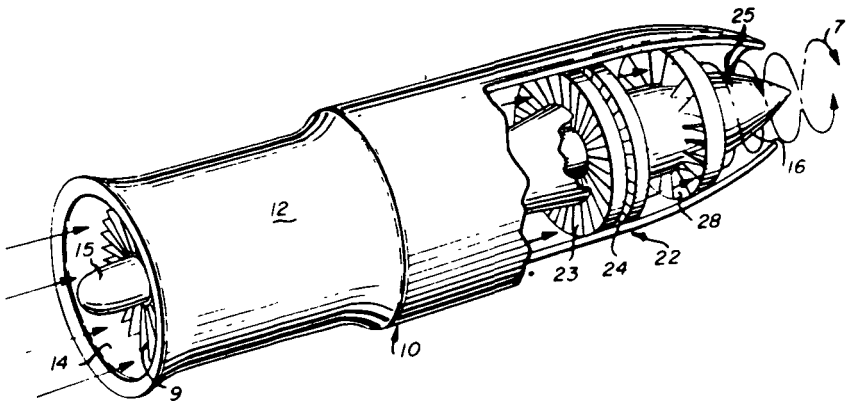
NASA Case No. ARC-10712  
Inventor: Ira S. Schwartz  
Canada  
Divisional application filed in  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 3,830,431

Filed 3-23-73  
Issued 8-20-74

A noise abating improvement for jet engines including the provision of apparatus in the primary flow stream of gas turbine engines such as turbojet, turbofan, turboprop, and other jet engines such as ram jets, scram jets and hybrid jet engines, or in either the primary and/or secondary flow streams of turbofan engines or the like, for imparting to the exhaust gases a component rotation or swirl about the engine's longitudinal axis. The rotary component in the exhaust gases has the effect of substantially suppressing the build up on sound energy normally produced by an axial flow exhaust stream.



# G-LOAD MEASURING AND INDICATOR APPARATUS

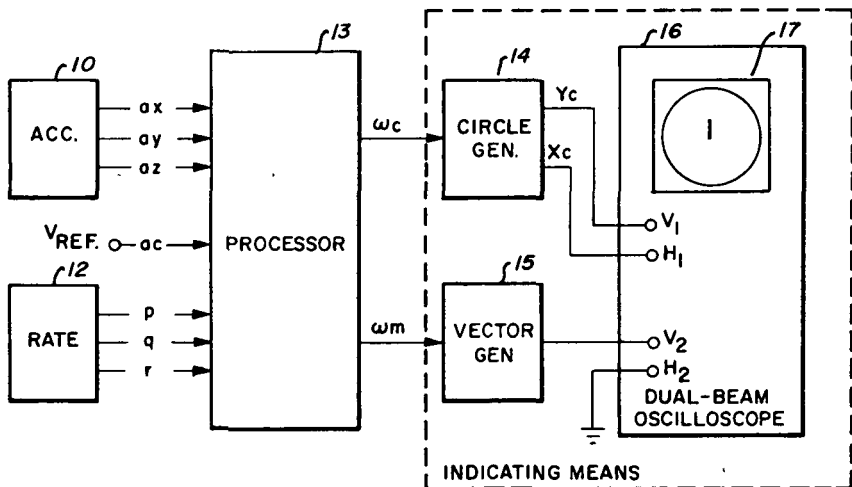
NASA Case No. ARC-10806-1  
 Inventor: James Carson Howard  
 Canada

Address inquiries to:  
 Ames Research Center  
 Attn: Patent Counsel  
 Mail Code: 200-11A  
 Moffett Field, CA 94035  
 U.S.A.

Corresponding to U.S. Patent No. 3,895,521

Filed 6-12-74  
 Issued 7-22-75

Although there are many critical loads that must not be exceeded on an aircraft, in the past no attempt has been made to measure all of these loads during flight. In a piloted aircraft, the pilot is subject to the same acceleration loads as the aircraft, and he automatically attempts to regulate them. However, in a remotely-piloted vehicle, the remote pilot is unable to sense the acceleration loads being experienced by the aircraft, and can inadvertently cause the aircraft to exceed its g-load limits thereby causing severe damage and even destruction of the airframe.





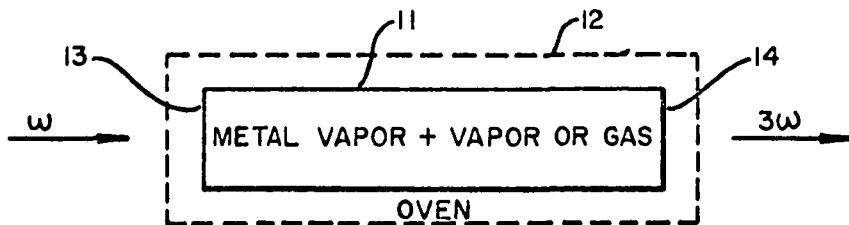
# OPTICAL RADIATION FREQUENCY CONVERTER AND METHOD

NASA Case No. HQN-10818  
Inventor: Stephen E. Harris  
Canada

Address inquiries to:  
NASA Headquarters  
Attn: Patent Counsel  
Mail Code: GP-4  
Washington, D.C. 20546  
U.S.A.

*No Patent in U.S.*

This invention is an Optical Radiation Frequency Converter employing metal vapor which is useful in the ultraviolet region of the spectrum. The invention comprises a cell for retaining the metal vapor or gas which is surrounded by an oven. Monochromatic radiation passes through windows in the cell and oven. In the preferred embodiment, the metal vapor for accomplishing third harmonics is one which has its fundamental harmonic frequencies resonance in the spectral region between the fundamental frequencies and the third harmonic. The metal vapor must have a suitable refractive index to provide for phase matching.



# PREPARATION OF DIELECTRIC COATINGS OF VARIABLE DIELECTRIC CONSTANT BY PLASMA POLYMERIZATION

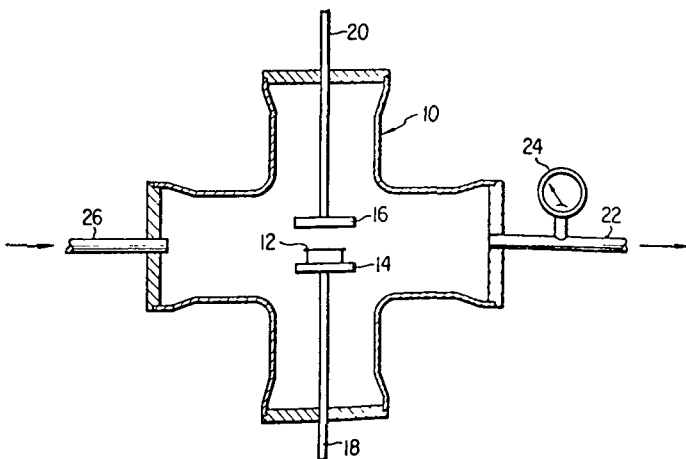
NASA Case No. ARC-10892  
Inventor: Martin Hodis, et al.  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 4,132,829

Filed 6-23-75  
Issued 1-2-79

A plasma polymerization process for the deposition of a dielectric polymer coating on a substrate comprising disposing the substrate in a closed reactor between two temperature-controlled electrodes connected to a power supply, maintaining a vacuum within the closed reactor, causing a monomer gas or a gas mixture of a monomer and diluent to flow into the reactor, generating a plasma between the electrodes, and varying and controlling the dielectric constant of the polymer coating being deposited by regulating the gas total and partial pressures, the electric field strength and frequency, and the current density. A monomer, such as a polar saturated or unsaturated nitrogen-containing compound, or a monomer and diluent, such as a saturated or unsaturated aliphatic hydrocarbon and nitrogen, can be polymerized to form a dielectric coating having a varying dielectric constant in accordance with this plasma polymerization process.



## ABRASION RESISTANT COATINGS FOR PLASTIC SURFACES

NASA Case No ARC-10915  
Inventor: John R Hollahan  
Austria, Canada, France,  
Italy, \* Japan, Great Britain,  
The Netherlands, West Germany

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

*Corresponding to U.S. Patent No. 4,137,365*

*Filed 11-21-75  
Issued 1-30-79*

Abrasion resistant protective coatings for plastic surfaces such as acrylics, polystyrenes and polycarbonates is provided by the plasma polymerization of at least one member of a group of organosilane compounds selected from a group consisting of vinyltrichlorosilane, tetraethoxysilane, vinyltriethoxysilane, tetravinylsilane, vinyltriacetoxysilane, hexamethyldisilazane, tetramethylsilane, vinyl-dimethylethoxysilane, vinyltrimethoxysilane and methyltrimethoxysilane. Plasma polymerization of these organosilane compounds provides an abrasion resistant protective coating for plastic optical surfaces together with a uniform optically clear layer in the 4,000 to 8,000 angstrom range. The advantages of applying plasma polymerization to the present organosilane compounds is further enhanced by the utilization of an additive gas during plasma polymerization to further increase the abrasion resistance of the protective coating.

\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**METHOD AND APPARATUS FOR ACCELERATING  
CHEMICAL REACTIONS USING A SPREAD BEAM  
DEFLECTOR WITH SINGLE OR MULTIPLE REFLECTORS**

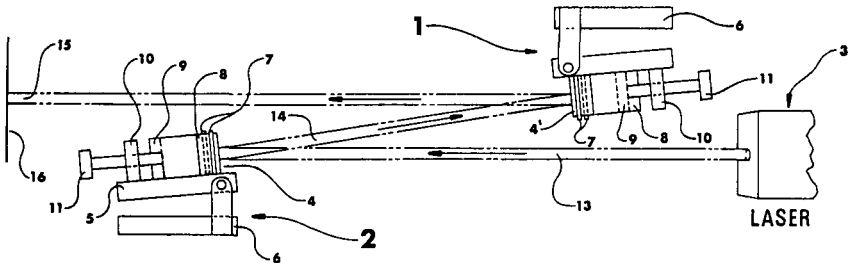
NASA Case No. HQN-10941-1  
Inventor: Hardy C. Svenson  
Canada, Japan, Finland, Italy,  
Switzerland, West Germany,  
France, Great Britain

Address inquiries to:  
NASA Headquarters  
Attn: Patent Counsel  
Mail Code: GP-4  
Washington, D.C. 20546  
U.S.A.

Corresponding to U.S. Patent No. 4,271,347

Filed 10-18-78  
Issued 6-2-81

An apparatus for spreading a coherent light beam produced by a laser or lasers into a selected pattern. The selected pattern of coherent light, generally a ribbon-like shape, can be used to place a desired amount of electromagnetic energy at a selected frequency for a selected time period on a generally flat surface. The projected coherent light pattern can be used to cure or dry inks without scorching the underlying paper. The control of the intensity of the coherent light allows drying operations at higher speeds than currently feasible.



## TOTALLY CONFINED EXPLOSIVE WELDING

NASA Case No. LAR-10941-1  
Inventor: Lawrence J. Bement  
Canada

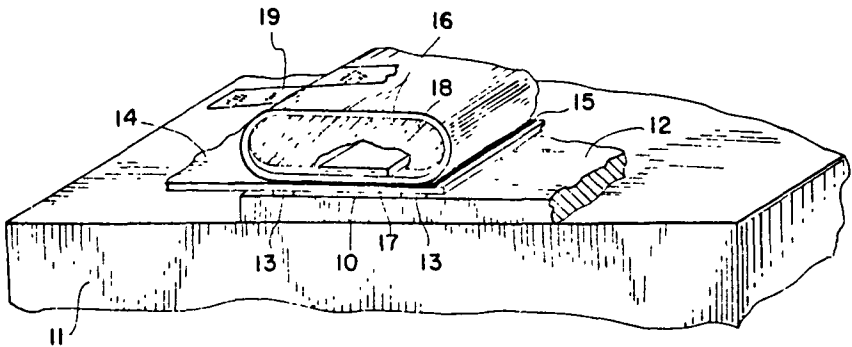
Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 3,797,098

Filed 9-14-72  
Issued 3-19-74

The invention illustrates and describes a method and apparatus for eliminating the noise and debris of explosive welding techniques. This is accomplished by placing the explosive in a complete enclosure so that both the sound and debris of the explosion are contained in the enclosure. The welding is accomplished by the explosive pressure applied through the wall of the enclosure to the pieces to be joined.

The novelty of the invention is in eliminating the safety hazards and detrimental psychological effects on the loud noises and scattering of debris which result from use of unconfined explosive welding while maintaining the inherent simplicity of the technique.



# A REVERSE OSMOSIS MEMBRANE OF HIGH UREA REJECTION PROPERTIES

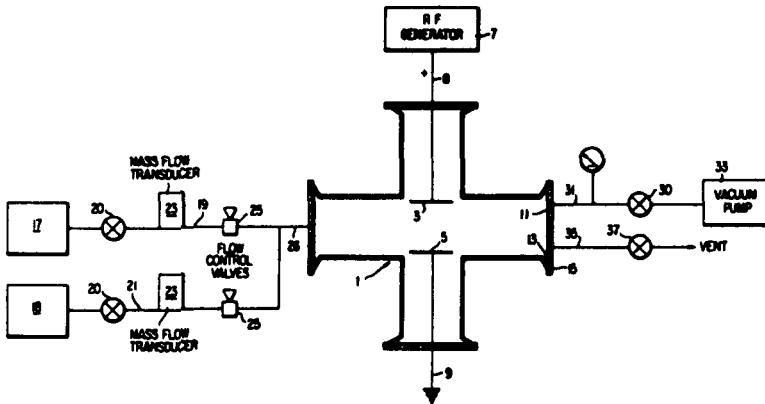
NASA Case No. ARC-10980-1  
Inventor: Cathrine C. Johnson  
France, West Germany,  
\* Japan, Great Britain,  
The Netherlands, Israel, Italy,  
Mexico

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 4,199,448

Filed 6-9-76  
Issued 4-22-80

Polymeric membranes suitable for use in reverse osmosis water purification because of their high urea and salt rejection properties are prepared by generating a plasma of an unsaturated hydrocarbon monomer and nitrogen gas from an electrical source and forming a polymeric membrane by depositing a polymer of said unsaturated monomer from said plasma onto a substrate, such that nitrogen from the nitrogen gas is incorporated within the polymer in a chemically combined form.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

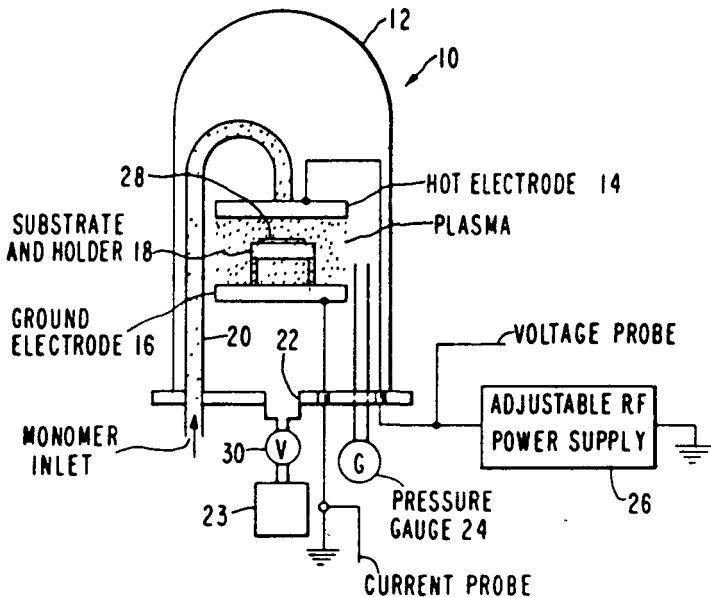
## PLASTIC LENS ANTIREFLECTION COATING

NASA Case No. ARC-10983-1  
Inventor: Ronald M. Kubacki  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

### No Corresponding U.S. Patent

The present invention relates to a method for coating plastic lenses, such as injection molded polymethylmethacrylate and polystyrene lenses, with one or more layers of an antireflection coating. The coating is deposited onto the lenses in a low temperature plasma. Preferably, the antireflection coating comprises a layer of polymerized perfluorobutene-2 which has been formed in situ onto the plastic lenses by the polymerization of a plasma of perfluorobutene-2 monomer.



# AUTOMATIC MULTIPLE-SAMPLE APPLICATOR AND ELECTROPHORESIS APPARATUS

NASA Case No. ARC-10991-1  
 Inventor: Benjamin W. Grunbaum  
 Canada, France, Great Britain,  
 Japan, Spain, Switzerland,  
 West Germany

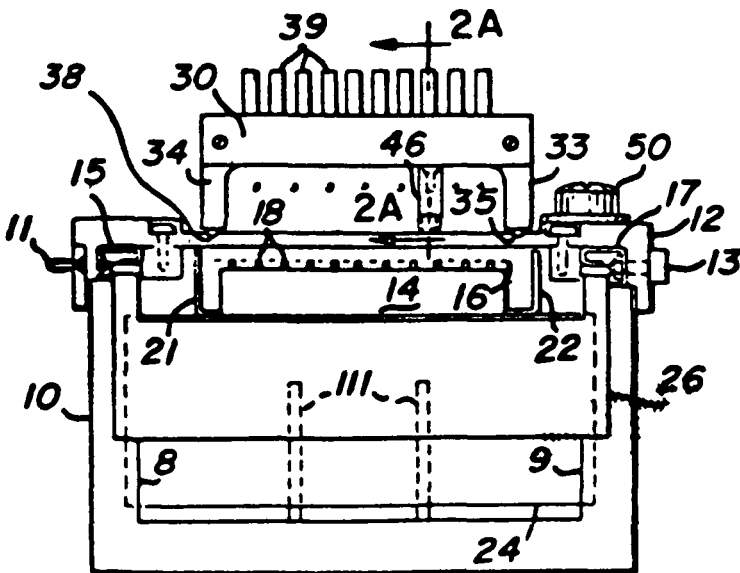
Address inquiries to:  
 Ames Research Center  
 Attn: Patent Counsel  
 Mail Code: 200-11A  
 Moffett Field, CA 94035  
 U.S.A.

Corresponding to U.S. Patent No. 4,061,561

Filed 11-24-76  
 Issued 12-6-77

An apparatus for performing electrophoresis and a multiple-sample applicator for use therewith. Electrophoresis is a physical process in which electrically charged molecules and colloidal particles, upon the application of a DC current, migrate along a gel or a membrane that is wetted with an electrolyte. If a membrane is used, its middle section is kept in tension horizontally above an electrolyte tank, while the ends of the membrane hang down into the electrolyte. If a gel is used, it is held in a tray which is placed on a colling plate, and wicks make contact with the electrolyte. The tank has unique protected electrodes for conducting the DC current.

A multiple-sample applicator is provided which coacts with a novel tank cover to permit an operator either to depress a single button, thus causing multiple samples to be deposited on the gel or on the membrane simultaneously, or to depress one or more sample applicators separately by means of a separate button for each applicator.





## BIOMEDICAL ULTRASONOSCOPE

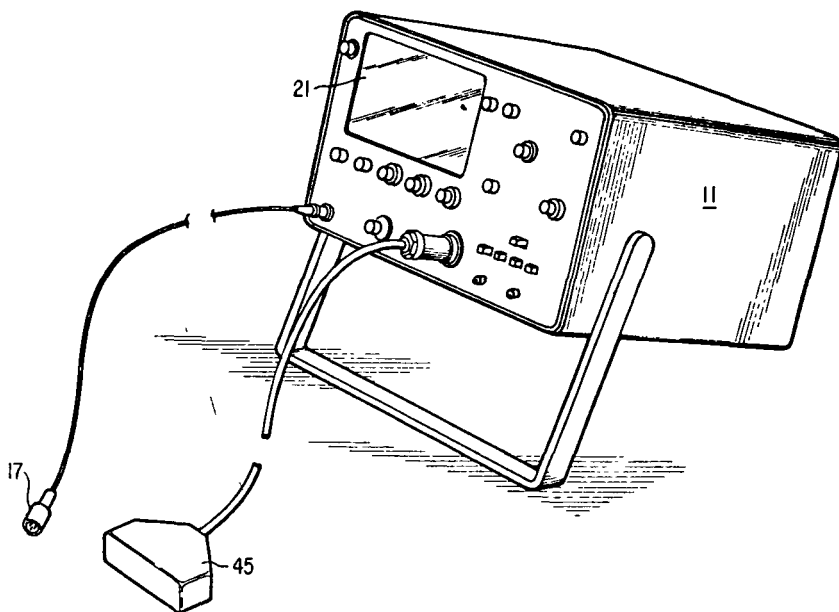
**NASA Case No. ARC-10994-1**  
**Inventor: Robert Dick Lee**  
**Canada**

*Address inquiries to:*  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

*Corresponding to U.S. Patent No. 4,156,304*

*Filed 9-29-77*  
*Issued 5-29-79*

The combination of a "C" mode scan electronics in a portable, battery powered bio-medical ultrasonoscope having "A" and "M" mode scan electronics. The "C" mode scan electronics comprises a plurality of transducer elements arranged in a row and adapted to be positioned on the skin of the patient's body for converting a pulsed electrical signal to a pulsed ultrasonic signal, radiating the ultrasonic signal into the patient's body, picking up the echos reflected from interfaces in the patient's body and converting the echos to electrical signals; a plurality of transmitters, each transmitter being coupled to a respective transducer for transmitting a pulsed electrical signal thereto and for transmitting the converted electrical echo signals directly to the receiver, a sequencer connected between the clock generator and the plurality of transmitters and responsive to the clock pulses for firing the transmitters in cyclic order; and a staircase voltage generator connected between the clock generator and the Y axis input of the cathode ray tube for generating a staircase voltage having steps synchronized by the clock pulses.



# EKG AND ULTRASONOSCOPE DISPLAY

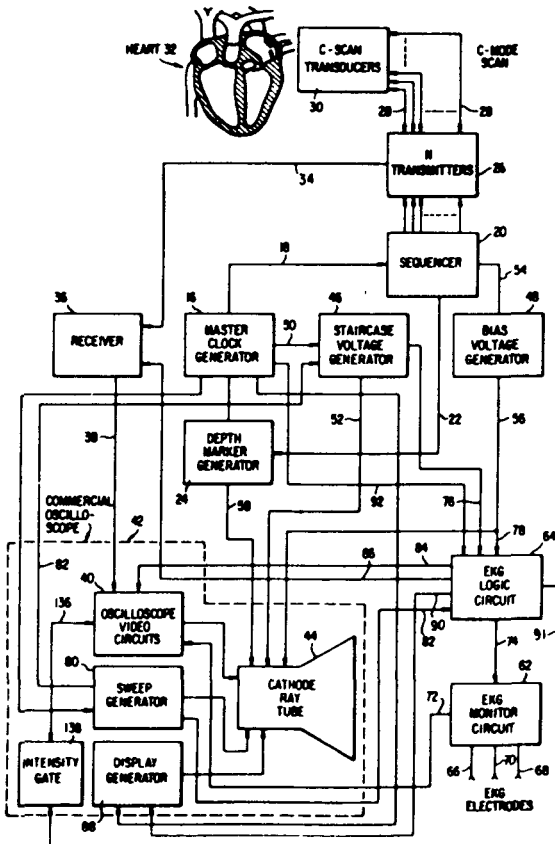
NASA Case No. ARC-10994-2  
Inventor: Robert Dick Lee  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 4,154,230

Filed 9-30-76  
Issued 5-15-79

A system is disclosed which permits simultaneous display of an EKG waveform in real time in conjunction with a two-dimensional cross-sectional image of the heart, so that the EKG waveform can be directly compared with dimensional changes in the heart. The apparatus of the invention includes an ultrasonoscope for producing a C-scan cross-sectional image of the heart. An EKG monitor circuit along with EKG logic circuitry is combined with the ultrasonoscope circuitry to produce on the same oscilloscope screen a continuous vertical trace showing the EKG waveform simultaneously with the heart image. The logic circuitry controls the oscilloscope display such that the display of both heart and EKG waveforms occurs on a real time basis.



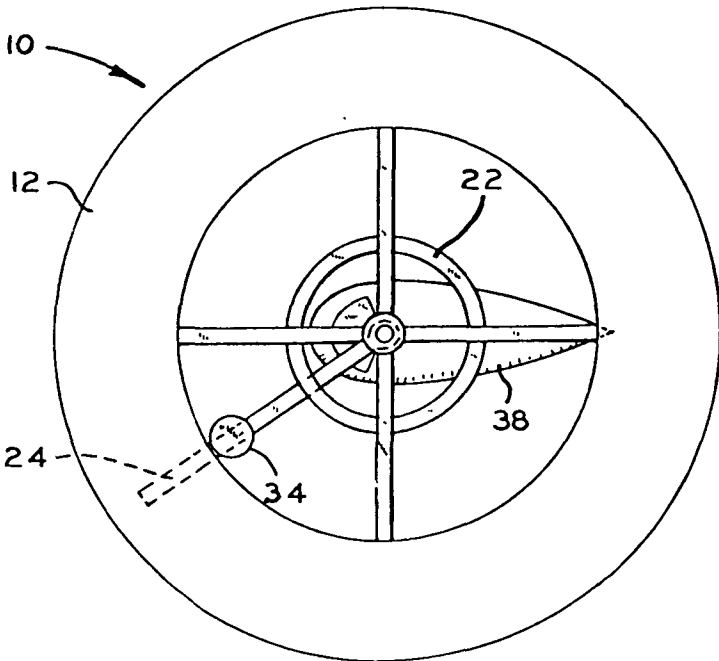
## AN ANNULAR WING

NASA Case No. NPO-11007  
Inventor: Harold J. Walker  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

*Corresponding to U.S. Patent Application No. 043,911 Filed 5-30-79*

An annular wing suited for supporting an aircraft. The wing comprises a rigid annular body of a substantially uniformly symmetrical configuration characterized by an annular positive lifting surface and cord line coincident with the segment of a line radiating along the surface of an inverted truncated cone whereby a decalage is established for the leading and trailing semi-circular portions of the body, relative to instantaneous line of flight, and a dihedral for the laterally opposed semi-circular portions of the body, relative to the line of flight, the direction of flight and climb angle or glide slope angle being established by selectively positioning the center of mass of the wing ahead of the aerodynamic center along a radius coincident with an axis for a selected line of flight.



# ILLUMINATION CONTROL APPARATUS FOR COMPENSATING SOLAR LIGHT

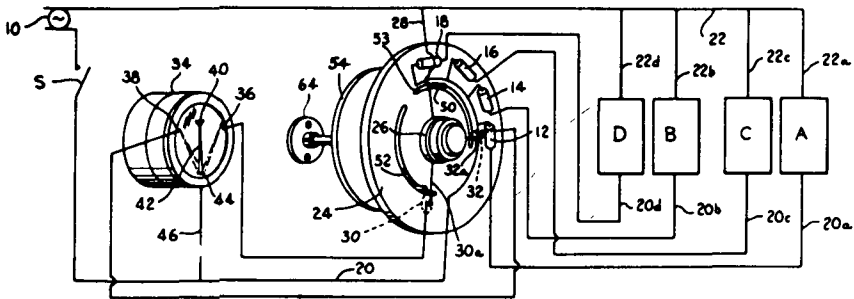
**NASA Case No. KSC-11010**  
**Inventor: Lester J. Owens**  
**Canada, \*Japan**

*Address inquiries to:*  
**Kennedy Space Center**  
**Attn: Patent Counsel**  
**Mail Code: PT-PAT**  
**Kennedy Space Center, FL**  
**32899**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,122,334*

*Filed 12-23-76*  
*Issued 10-24-78*

Illumination control apparatus for supplementing light from solar radiation with light from an artificial light source to compensate for periods of insufficient levels of solar light to maintain a desired illumination level within an interior space comprising an artificial light source connected to an electrical power source with switch means for selectively energizing said light source, actuator means for controlling the on-off operation of the switch means, a light sensor connected to the actuator means for controlling the actuator means in response to the illumination level of the interior space, and a limit switch carried adjacent the actuator for limiting the movement of the actuator within a predetermined range so as to prevent further movement thereof during detection of erroneous illumination conditions.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**BACTERIAL ADENOSINE TRIPHOSPHATE AS A  
MEASURE OF URINARY TRACT INFECTION**

**NASA Case No. GSC-11092-2**

**Inventor: Emmett W. Chappelle, et al.  
Canada**

*Address inquiries to:*  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

*Corresponding to U.S. Patent No. 3,745,090*

*Filed 4-30-71  
Issued 7-10-73*

A method is provided for determining bacterial levels in urine samples, which method depends on the quantitative determination of bacterial adenosine triphosphate (ATP) in the presence of non-bacterial adenosine triphosphate. After the removal of non-bacterial ATP, the bacterial ATP is released by cell rupture and is measured by an enzymatic bioluminescent assay using an enzyme obtained from the firefly.

# AN ELECTRICAL SHORT LOCATOR

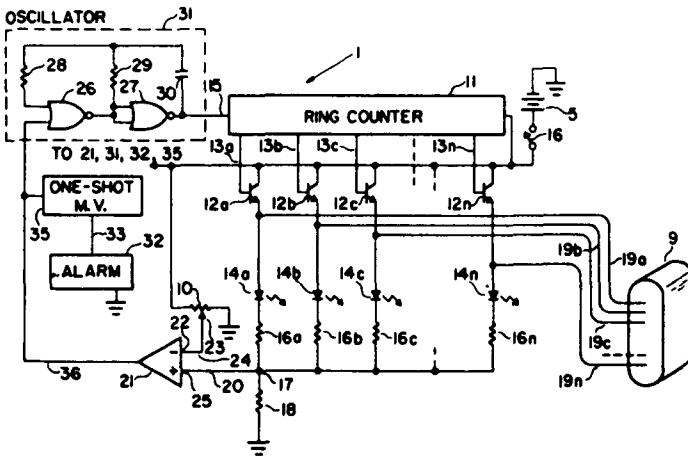
NASA Case No. ARC-11116-1  
Inventor: Gordon J. Deboo, et al.  
Canada, Japan, Great Britain,  
France, West Germany,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 4,282,479

Filed 8-24-79  
Issued 8-4-81

An apparatus for locating electrical shorts while an electrical circuit is being fabricated or assembled. A ring counter derives input pulses from a squarewave oscillator. The outputs of the counter are fed through transistors to an array of light emitting diodes. Each diode is connected to an electrical conductor, such as a bus bar, that is to be tested. In the absence of a short between two electrical conductors the diodes are sequentially illuminated. When a short occurs, a comparator/multivibrator circuit triggers an alarm and stops the oscillator and the sequential energization of the diodes. The two diodes that remain illuminated identify the electrical conductors that are shorted.



## MICROELECTROPHORETIC APPARATUS AND PROCESS

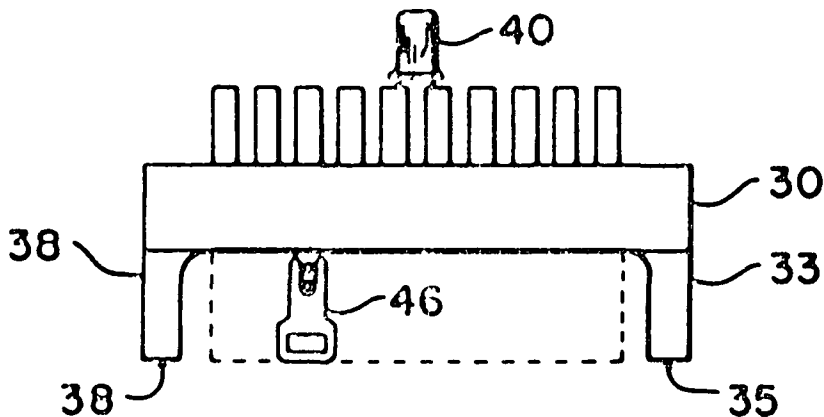
NASA Case No. ARC-11121-1  
Inventor: Benjamin W. Grunbaum  
Canada, France,  
Great Britain, Spain,  
Switzerland, West Germany

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent No. 4,180,471

Filed 11-10-77  
Issued 12-19-78

Gel tray and lid assemblies for use with slotted electrophoretic membranes which include a multisample applicator capable of applying up to 10 samples consecutively or simultaneously, and a temperature control plate for dissipating the heat produced by electrophoresis in a gel. The trays and membranes can be marketed ready for use as electrophoretic media or impregnated with various specific substrates and dyes which can develop the electrophoretic patterns of up to 30 individual protein samples in up to 10 tray or membrane compartments.



## STABILIZATION OF PIGMENTS

NASA Case No. NPO-11139  
Inventor: Stanley R. Morrison, et al.  
Canada

*Address inquiries to:*  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

*No Patent in U.S.*

A method of coating pigment particles is described for preventing degradation and discoloration by ultraviolet light. The chemical species utilized serve as recombination sites for the electrons and holes produced by the radiation. The chemical species selected for a particular pigment should be one equivalent such that stable oxidation stages are formed differing by one electronic charge. Zinc oxide pigments coated with ferri- and ferrocyanide are discussed as an example.

\*Patent rights in the United States are held by Stanford Research Institute. Foreign patent rights are available for licensing from NASA.



## STORED CHARGE TRANSISTOR

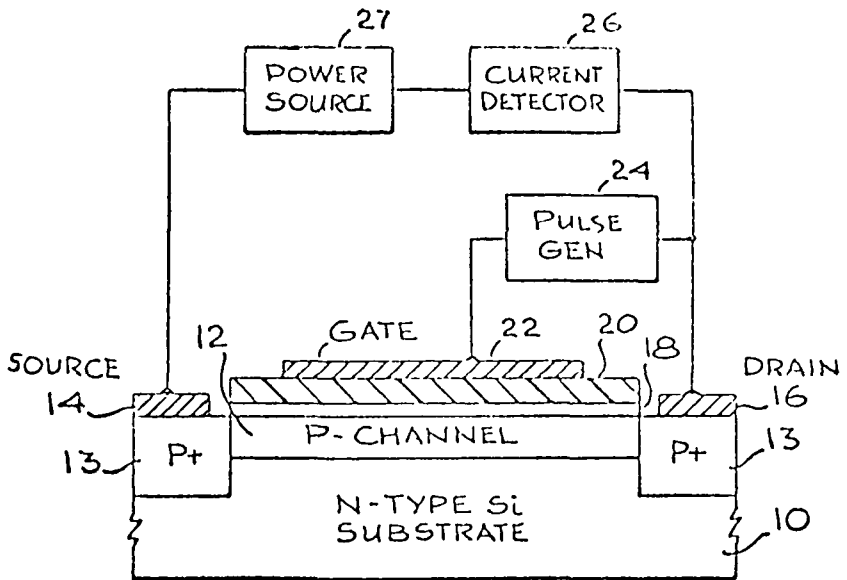
NASA Case No. NPO-11156-2  
Inventor: Joseph Maserjian  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,906,296

Filed 8-25-71  
Issued 8-16-75

A stored charge device of the general type designated as an MNOS field-effect transistor, has its operation improved by embedding a thin metal layer between two insulating films used in the transistor. The embedded metal layer technique is also used to provide a two-terminal thin-film stored charge device, consisting of a "metal-insulator-embedded metal-insulator-metal", sandwich structure which can be used in high-density memory arrays.



# SPINE IMMOBILIZATION METHOD AND APPARATUS

NASA Case No. ARC-11167-1

Inventor: Kenneth H. Cambson, et al.  
 Canada, Japan, Great Britain,  
 West Germany, France,  
 The Netherlands, Sweden,  
 Switzerland

Address inquiries to:

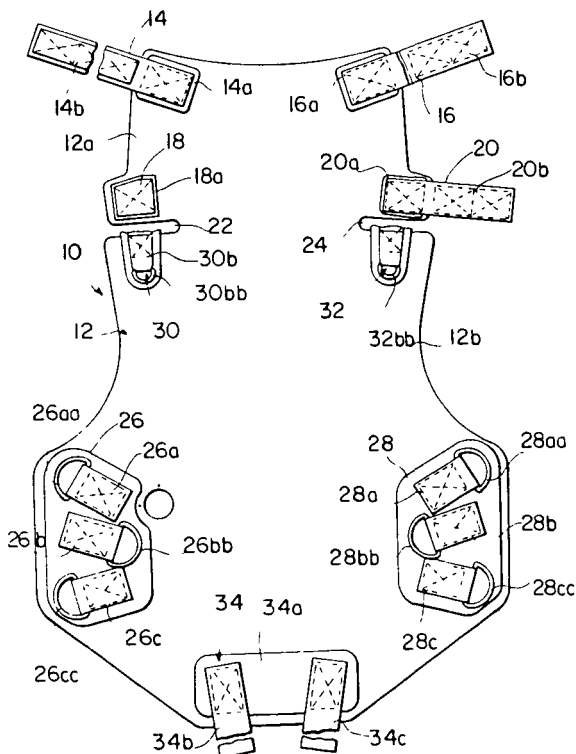
Ames Research Center  
 Attn: Patent Counsel  
 Mail Code: 200-11A  
 Moffett Field, CA 94035  
 U.S.A.

Corresponding to U.S. Patent No. 4,261,349

Filed 7-13-79

Issued 4-14-81

A spine immobilization method and apparatus which make use of a normally flat, flexible bladder filled with beads or micro-balloons that form a rigid mass when pressure within the bladder is decreased below ambient by the use of a suction pump so that the bladder can be conformed to the torso of the victim and provide the desired restraint. The bladder is strapped to the victim prior to being rigidified by straps which avoid the stomach area. The bladder is secured to a rigid support so as to enable removal of a victim after the bladder has been made rigid. A double sealing connector is used to connect the bladder to the suction pump and a control valve is employed to vary the pressure within the bladder so as to soften and harden the bladder as desired.



## FIBROUS REFRACTORY COMPOSITE INSULATION

NASA Case No. ARC-11169-1  
Inventor: Daniel B. Leiser, et al.  
Canada

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

*Corresponding to U.S. Patent No. 4,148,962*

*Filed 9-8-78  
Issued 4-10-79*

A refractory composite insulating material prepared from silica fibers and aluminosilicate fibers in a weight ratio ranging from 1:19 to 19:1, and about 0.5 to 30% boron oxide, based on the total fiber weight. The aluminosilicate fiber and boron oxide may be aluminoborosilicate fibers and additional free boron oxide may be incorporated in the mix up to the 30% limit. The composites just described are characterized by the absence of a nonfibrous matrix.

## EXPLOSIVELY WELDED SCARF JOINT

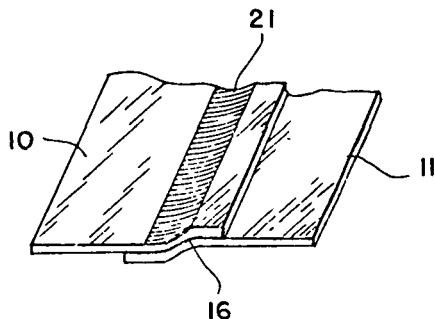
NASA Case No. LAR-11211-1  
Inventor: Lawrence J. Bement  
Canada, Japan

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 3,842,485

Filed 11-1-72  
Issued 10-22-74

This invention relates to a method for welding thin sheet metal members by the simultaneous bonding and shaping into an essentially planar configuration without the addition of a bonding material. This is accomplished by explosively welding overlapped sheets while simultaneously bending them such that the major portions of the two sheets are left in a single plane. The method furnishes a simple and economical method of welding thin sheet aluminum and titanium with bonds which exhibit the strength of the parent metal.



# AUTONOMOUS NAVIGATION SYSTEM

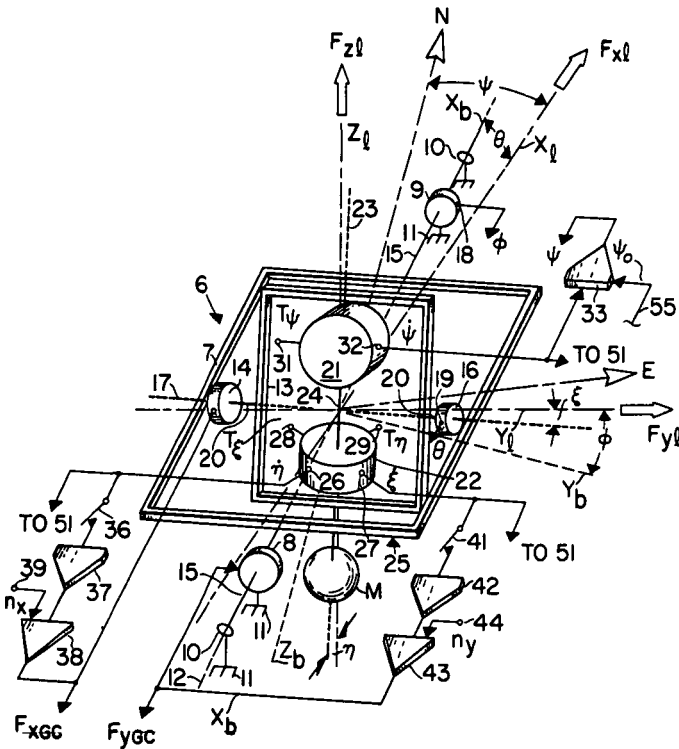
**NASA Case No. ARC-11257-1**  
**Inventor: Shmuel J. Merhav**  
**Canada, Japan, Great Britain,**  
**West Germany, France,**  
**The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
**Ames Research Center**  
**Attn: Patent Counsel**  
**Mail Code: 200-11A**  
**Moffett Field, CA 94035**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,244,215*

*Filed 9-24-79*  
*Issued 1-13-81*

An inertial navigation system utilizing a servo-controlled two-degree of freedom pendulum to obtain specific force components in the locally level coordinate system. The pendulum includes a leveling gyroscope and an azimuth gyroscope supported on a two-gimbal system. The specific force components in the locally level coordinate system are converted to components in the geographical coordinate system by means of a single Euler transformation. The standard navigation equations are solved to determine longitudinal and lateral velocities. Finally, vehicle position is determined by a further integration.



# IMPROVED NARROW BAND FM SYSTEM FOR VOICE COMMUNICATIONS

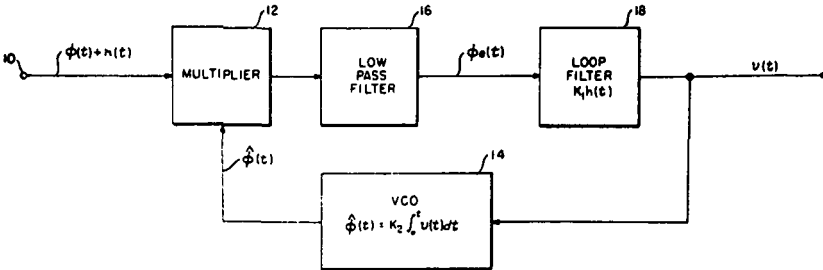
**NASA Case No. GSC-11261-1**  
**Inventor: Theodore Lerner**  
**Canada**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

\* *Corresponding to U.S. Patent No. 3,876,939*

*Filed 1-20-72*  
*Issued 4-8-75*

The Narrow Band FM transmitter transmits voice signals on a FM carrier signal. The transmitter includes preemphasis for flattening the frequency spectrum. The receiver includes a demodulator for demodulating the FM carrier with decreasing band width as a function of the carrier strength. Limiting means are employed for decreasing the carrier strength as the incoming carrier-to-noise ratio decreases and a deemphasis circuit for restoring the frequency spectrum of the original voice signal.



\*U.S. patent rights waived to Bell Aerospace Co., Division of Textron, Inc., P.O. Box 1, Buffalo, New York, 14240.

## LONG RANGE LASER TRAVERSING SYSTEM

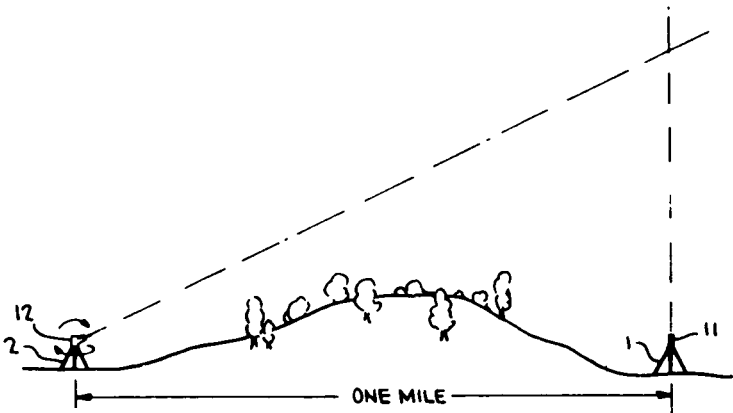
NASA Case No. GSC-11262-1  
Inventor: Louis Caudill  
Canada

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,804,525

Filed 7-14-71  
Issued 4-16-74

The relative azimuth bearing between first and second space terrestrial points (which may be obscured from each other by intervening terrain) is measured by placing at one of the points a laser source for projecting a collimated beam upward in the vertical plane. The collimated laser beam is detected at the second point by positioning the optical axis of a receiving instrument for the laser beam in such a manner that the beam intercepts the optical axis. In response to the optical axis intercepting the beam, the beam is deflected into two different ray paths by a beam splitter having an apex located on the optical axis. The energy in the ray paths is detected by separate photoresponsive elements that drive logic networks.



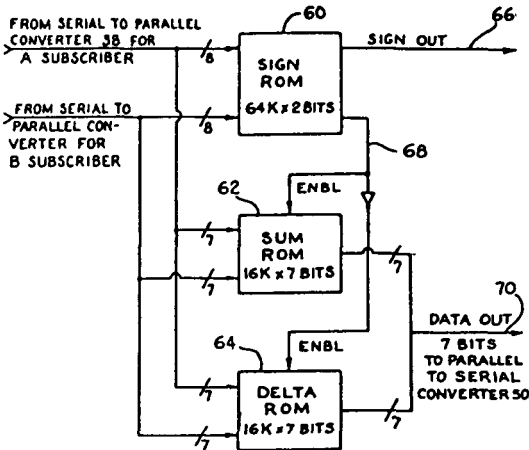
# A METHOD AND APPARATUS FOR OPERATING ON COMPANDED PCM VOICE DATA

**NASA Case No. KSC-11,285-1**  
**Inventor: Frank Byrne**  
**Australia, Canada, Belgium,**  
**France, West Germany, Great**  
**Britain, Israel, Italy, Japan,**  
**The Netherlands, Sweden,**  
**Switzerland, Taiwan**

*Address inquiries to:*  
**Kennedy Space Center**  
**Attn: Patent Counsel**  
**Mail Code: PT-PAT**  
**Kennedy Space Center**  
**FL 32899**  
**U.S.A.**

*Corresponding to U.S. Patent Application No. 655.601* *Filed 9-28-84*

A method and apparatus for digitizing audio signals being generated from a plurality of parties in order to provide audio communication between the parties with a minimum of interference. Each of the parties has an audio transmitter and receiver provided for transmitting and receiving audio signals. The audio signals are converted to a PCM companded signal for transmitting to a remote location and then converting each of the companded signals to a first eight parallel signal. A pre-programmed ROM is located at the remote location and has a plurality of inputs and outputs. Each of the eight-bit parallel signals from the individual parties are fed to the ROM causing the ROM to produce an eight-bit signal on the output representing the instantaneous sum of the eight-bit parallel signals being supplied to the inputs thereof. The eight-bit parallel signal appearing on the output of the ROM is converted to a serial-digital signal by a parallel-to-serial converter for transmitting over a single line to another serial-to-parallel converter prior to being fed through a digital-to-analog converter to the receiver for producing the audio signal at the receiver.





## DUAL CYCLE AIRCRAFT TURBINE ENGINE

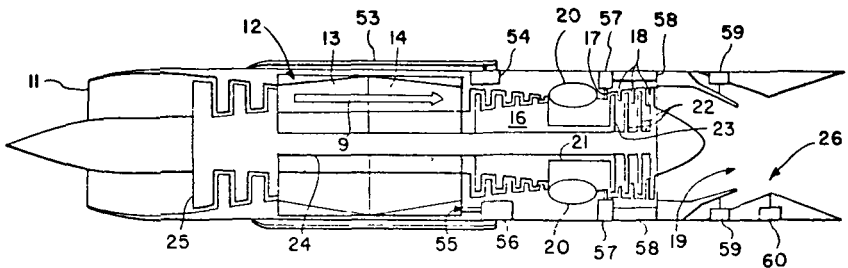
NASA Case No. LAR-11310-1  
Inventor: Mark R. Nichols  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 4,033,119

Filed 9-6-73  
Issued 7-5-77

This invention describes a method and apparatus applicable to jet engines for improving operating efficiency over broad ranges of flight conditions and for reducing engine noise output in take-off and landing by controlling the airflow entering and exiting the engines. A turbojet engine apparatus is described which operates efficiently at both subsonic and supersonic speeds and a method is described which enables a turbofan with an associated satellite turbojet or turbofan to operate more efficiently at both subsonic and supersonic speeds. In both cases, take-off and landing noise is reduced substantially. The apparatus consists essentially of arranging for two separate portions of an engine to act upon one airstream or, alternately, to operate on independent airstreams.



# MAGNETIC HEADING REFERENCE

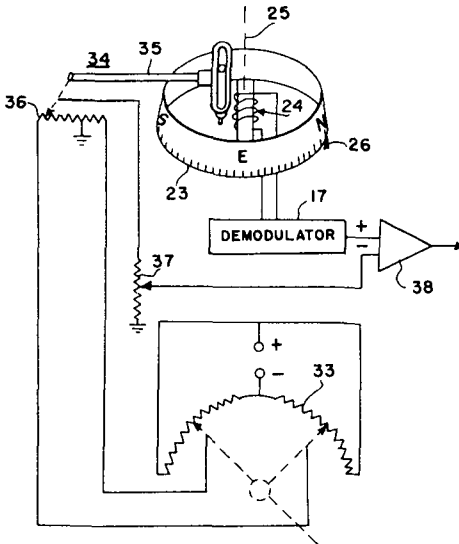
NASA Case No. LAR-11387  
Inventor: Howell Douglas Garner  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 3,943,763

Filed 12-11-74  
Issued 3-16-76

This invention employs a magnetometer as a magnetic heading reference for a vehicle such as a small aircraft. The magnetometer is mounted on a directional dial in the aircraft in the vicinity of the pilot such that it is free to turn with the dial about the yaw axis of the aircraft. The invention includes a circuit for generating a signal proportional to the northerly turning error produced in the magnetometer due to the vertical component of the earth's magnetic field. This generated signal is then subtracted from the output of the magnetometer to compensate for the northerly turning error.



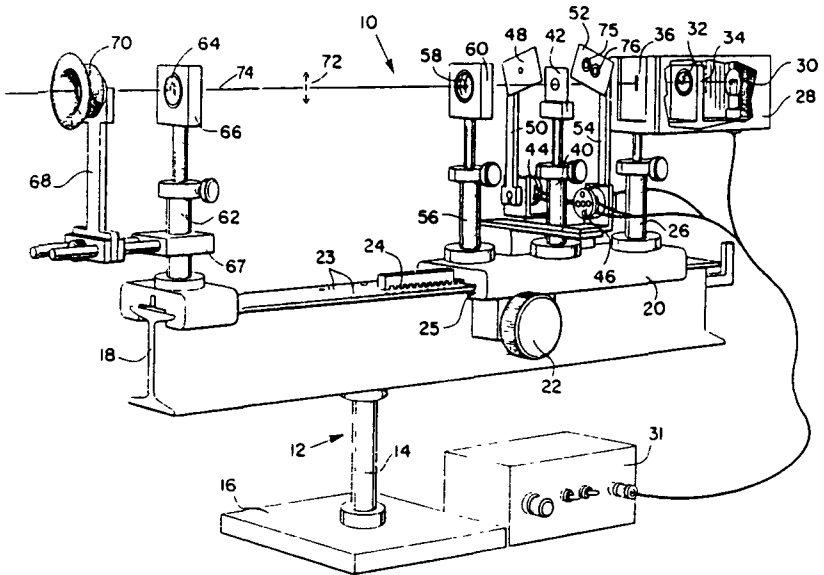
## VISUAL ACCOMMODATION TRAINER-TESTER

NASA Case No. ARC-11,426-1  
Inventor: Robert J. Randle, Jr.  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, Israel, Japan,  
The Netherlands, Sweden,  
Switzerland, Taiwan

Address inquiries to:  
Ames Research Center  
Attn: Patent Counsel  
Mail Code: 200-11A  
Moffett Field, CA 94035  
U.S.A.

Corresponding to U.S. Patent Application No. 526,741 Filed 8-26-83

This invention relates to a device for training of the human visual accommodation system. Specifically, the device is useful for training a person to volitionally control his focus to his far point (normally infinity) from a position of myopia due to functional causes. The functional causes could be due, for example, to a behavioral accommodative spasm or the effects of an empty field. The device may also be used to measure accommodation, the accommodation resting position and the near and far points of vision. The components may be packaged in a very small volume. It is possible, for instance, to helmet-mount the device for human engineering investigations involving piloting aircraft, driving cars, operating computer terminals and so forth.



## AMPLITUDE STEERED ANTENNA ARRAY

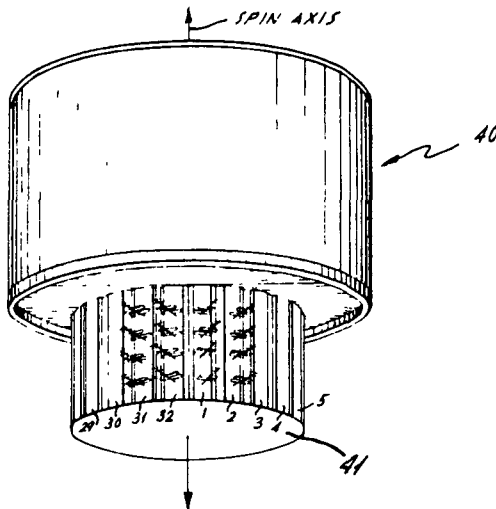
NASA Case No. GSC-11446  
Inventor: George Koboloff, et al.  
Canada

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

\* Corresponding to U.S. Patent No. 3,806,932

Filed 6-15-72  
Issued 4-23-74

A spin stabilized satellite has an electronically despun antenna array comprising a multiplicity of peripheral antenna elements. A high gain energy beam is established by connecting a suitable fraction or array of the elements in phase. The beam is steered or caused to scan by switching elements in sequence into one end of the array as elements at the other end of the array are switched out. The switching transients normally associated with such steering are avoided by an amplitude control system. Instead of abruptly switching from one element to the next, a fixed value of power is gradually transferred from the element at the trailing edge of the array to the element next to the leading edge. Thus as the satellite rotates, power is reduced on one element and power is increased on the other element thereby avoiding switching transients and maintaining constant total array power at all times.



\*U.S. patent rights waived to Philco Ford Corporation, Union Meeting Road, Bluebelle, PA 19422.

# RECORDER/PROCESSOR APPARATUS

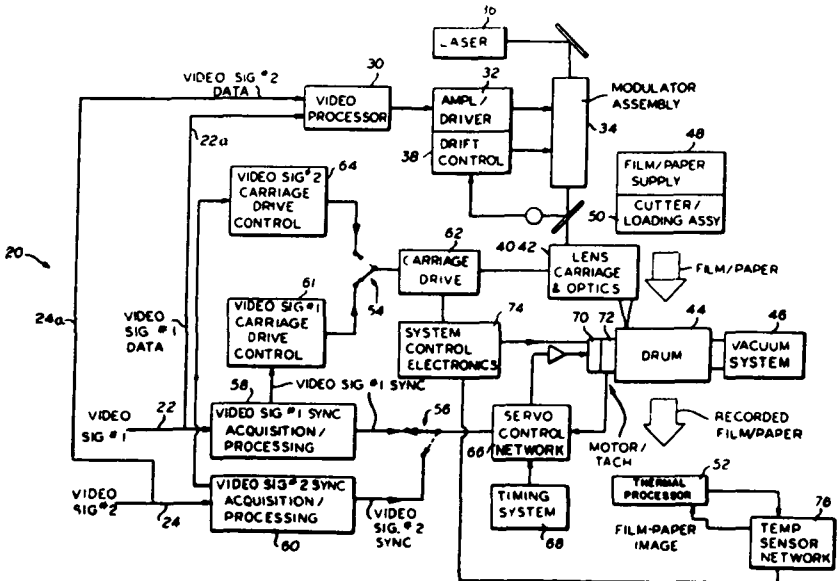
NASA Case No. GSC-11553  
 Inventor: Ivan H. Shim, et al.  
 Japan

Address inquiries to:  
 Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

Corresponding to U.S. Patent No. 3,781,902

Filed 9-7-71  
 Issued 12-25-73

This is an apparatus for recording and thermally processing data. A laser beam, modulated by a video signal generates a raster so as to expose a latent image of the input information on a storage medium. A rotating drum in conjunction with an incrementally driven lens carriage associated with the laser optical system provides the raster generation. The drum is automatically loaded with the storage medium from a supply means and automatically unloaded to a thermal processor upon completion of recording. The latent image is processed by the controlled application of heat so as to produce an actual displayable image corresponding to the data input at the output of the apparatus.



# MILLIMETER WAVE PUMPED PARAMETRIC AMPLIFIER

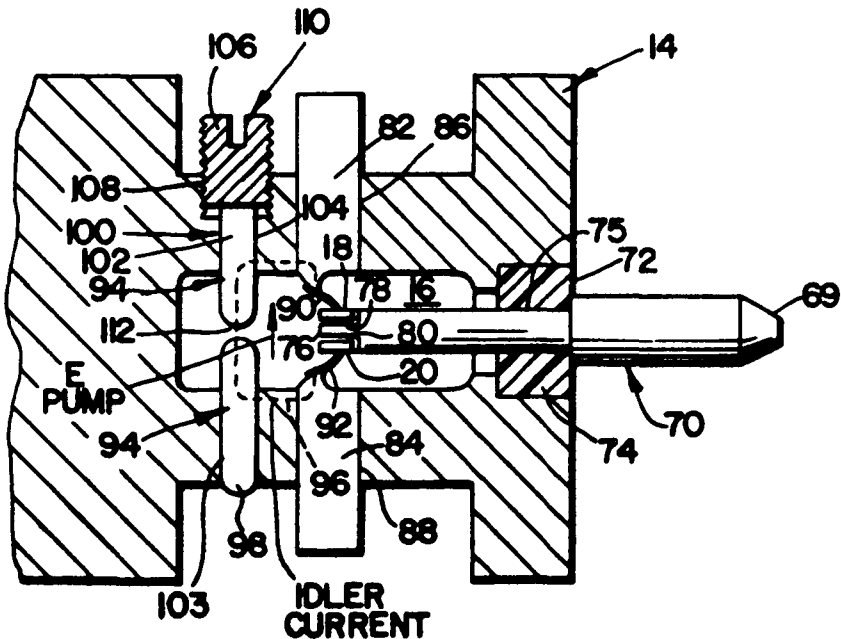
NASA Case No. GSC-11617  
 Inventor: Lawrence E. Dickens  
 Canada

Address inquiries to:  
 Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

Corresponding to U.S. Patent No. 3,833,857

Filed 10-2-73  
 Issued 9-3-74

The present invention is directed to a new parametric amplifier structure which exhibits a large gain-bandwidth product and low noise characteristics without cryogenic cooling. In addition, higher idler frequencies are attained and which are easily adjustable in resonant frequency. The amplifier includes a stacked pair of uncased varactor diode chips within a waveguide channel, which chips are stacked in a predetermined direction.



# ELECTRON BEAM CONTROLLER

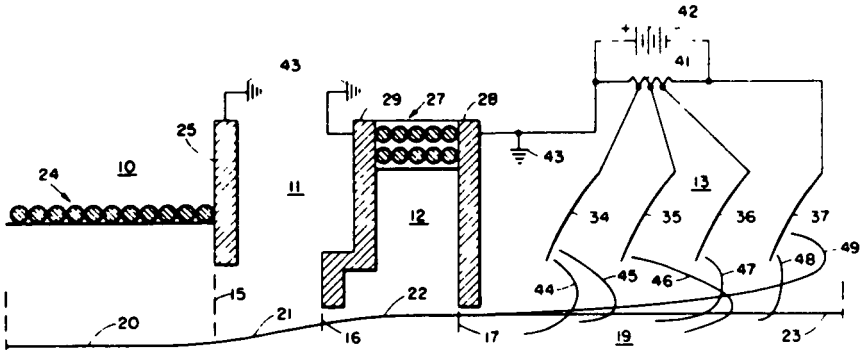
NASA Case No. LEW-11617-1  
Inventor: Henry G. Kosmahl  
Canada, Japan

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 3,764,850

Filed 6-27-72  
Issued 10-9-73

A magnet applies a magnetic field of predetermined intensity and shape to a spent electron beam over an axial distance having a predetermined relationship to the frequency of operation of a utilization device which has extracted energy from the electron beam and at a predetermined axial distance after the beam has left the magnetic field of the utilization device and entered the beam expansion region and beam stabilization region. The stabilizing magnetic field is terminated abruptly before the electron beam enters a collector apparatus.



# WINGTIP VORTEX DISSIPATOR FOR AIRCRAFT

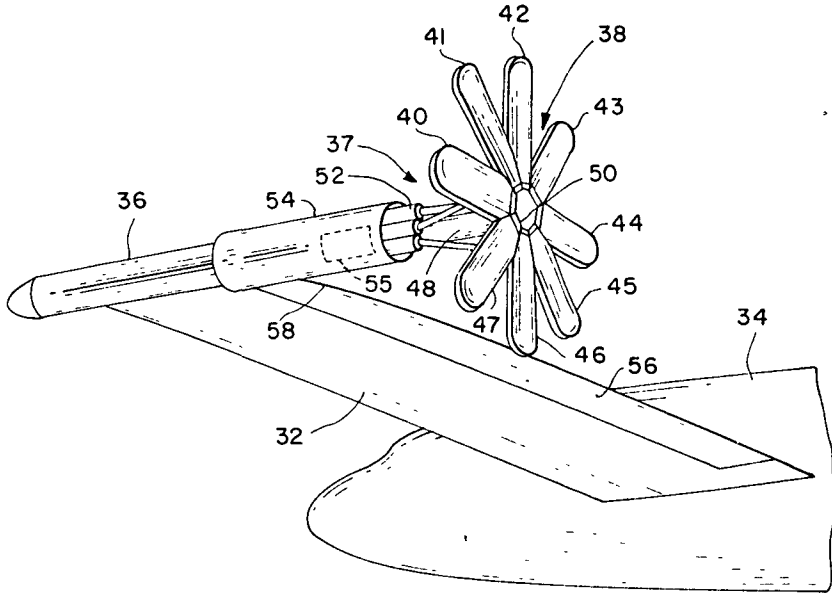
NASA Case No. LAR-11645  
Inventor: James C. Patterson, Jr.  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 3,984,070

Filed 5-24-74  
Issued 10-5-76

The lift-induced wingtip vortex associated with large jet aircraft has become a major problem to the air traffic controller as well as an unseen hazard to smaller aircraft. In this invention, a means for attenuating this potentially dangerous wingtip vortex is disclosed which consists of a drogue device attached downstream of the wingtip which creates a positive pressure gradient just downstream from the wing. The positive pressure forces a break up of the rotational air flow of the vortex.





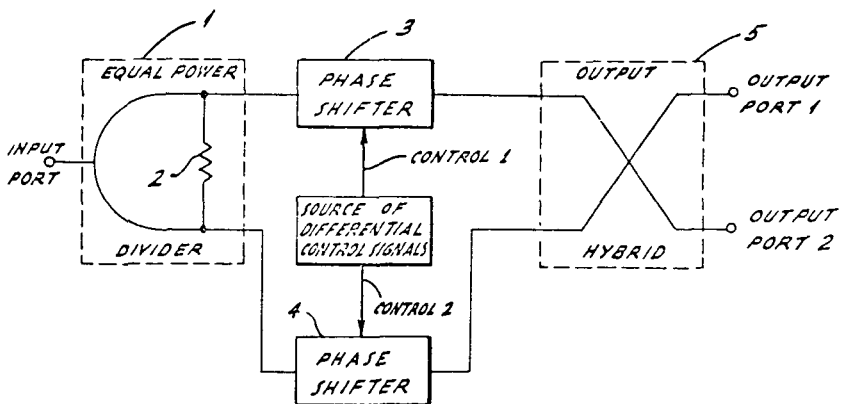
# VOLTAGE CONTROLLED VARIABLE POWER DIVIDER

NASA Case No. GSC-11659  
Inventor: Alex Savarin  
Canada

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

*No Corresponding U.S. Patent*

In the voltage controlled variable power divider of the invention, the total output power equals the input power and both outputs have constant and equal phase. The applied power is split into two channels, each of which contains a variable phase shifter. The channels are combined in a 90-degree hybrid coupler so that the relative amplitude in the hybrid outputs is a function of the phase of the hybrid input signals. The phase shifters are voltage driven in opposition so that constant phase is achieved for all output power division ratios.



## CONNECTOR

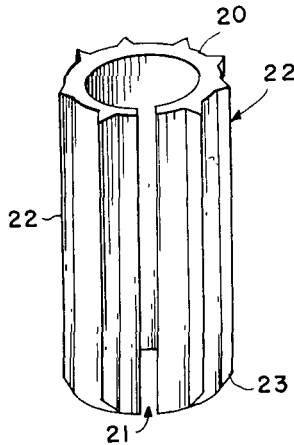
NASA Case No. LAR-11709  
Inventor: Donald Eugene Pizzeck  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 3,964,813

Filed 2-10-75  
Issued 6-22-76

A connector for connecting circuits located on different layers of a multilayer printed circuit board through a hole in the board. The connector is a hollow cylindrical conductor made from a conductive, metallic, springy material. A slit in the conductor and a plurality of sharp teeth located on the outside of the conductor extend the full length of the conductor. The conductor has a slightly larger outside diameter than the diameter of the hole. Consequently, when the connector is forced into the hole the springback (resiliency) of the connector forces the teeth against the circuits on the printed circuit board thereby providing a positive connection between the circuits.



## TWISTED MULTIFILAMENT SUPERCONDUCTOR

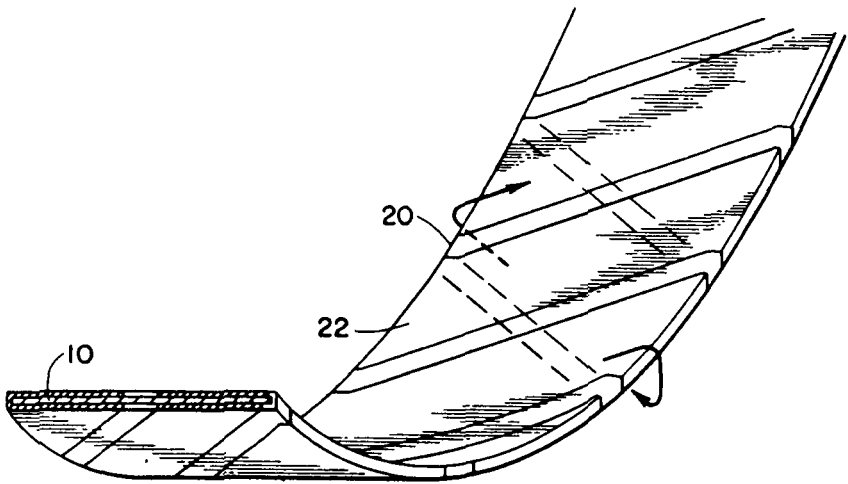
NASA Case No. LEW-11726-1  
Inventor: William D. Coles  
Canada

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 3,737,824

Filed 8-11-72  
Issued 6-05-73

Masking selected portions of a ribbon and forming an inter-metallic compounds on the unmasked portions by a controlled diffusion reaction produces a twisted filamentary structure. The masking material prohibits the formation of superconductive material on predetermined areas of the substrate.



# DUALLY MODE-LOCKED Nd: YAG LASER

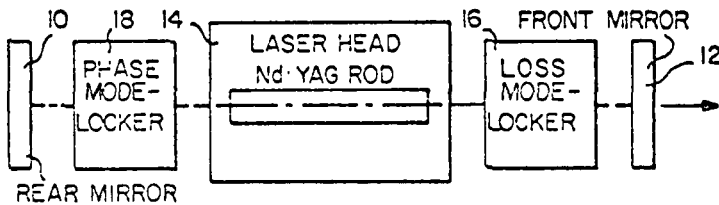
NASA Case No. GSC-11746-1  
Inventor: John Osmundson  
Canada

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,869,680

Filed 8-31-73  
Issued 3-4-75

A need exists in laser technology whereby stable mode-locking can be achieved for a pulsed laser system which is simple and which avoids other known disadvantages. The present invention meets these requirements and includes a pair of partially reflecting mirrors forming the laser cavity. The dual mode-locking elements will pass timed pulses without being extinguished.



# DISH ANTENNA HAVING SWITCHABLE BEAMWIDTH

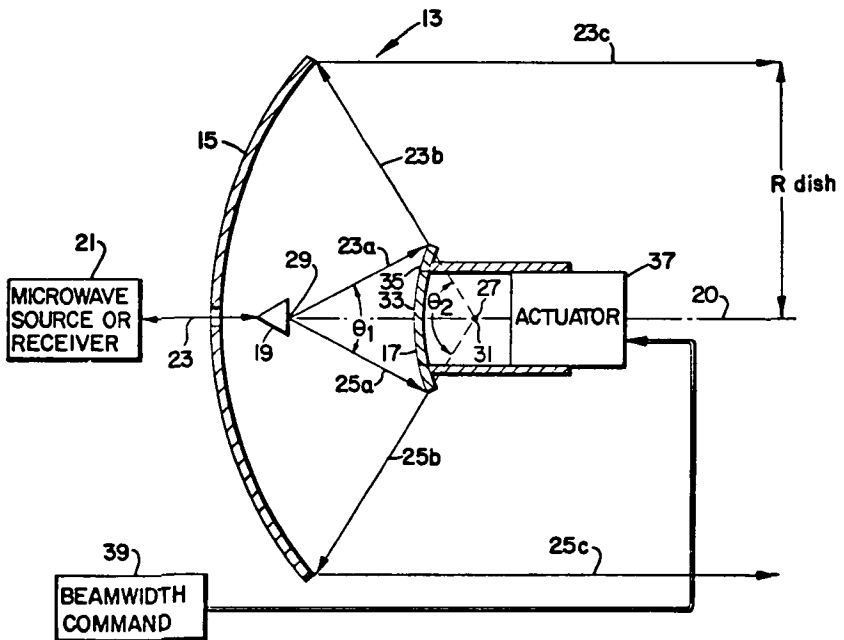
**NASA Case No GSC-11760-1**  
**Inventor: Richard E. Schmitt**  
**Canada**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 3,866,233*

*Filed 9-10-73*  
*Issued 2-11-75*

The need frequently arises to augment narrow beamwidth transmitting and/or receiving antennas with a wide beamwidth "acquisition" mode. The present invention is a switchable beamwidth antenna employing a common main reflecting dish operable in at least two different beamwidth modes. It includes a concave parabolic main reflecting dish with a central circular region and a surrounding coaxial annular region. The central region of the main dish can be excited for wide beamwidth or the entire dish for narrow beamwidth.



# TWO-DIMENSIONAL RADIANT ENERGY ARRAY

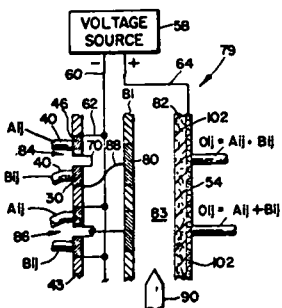
NASA Case No. GSC-11839-1  
David H. Schaefer, et al.  
Japan

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,996,455

Filed 5-8-74  
Issued 12-7-76

Conventional digital computers are composed of devices which perform logical operations on one-dimensional electrical binary signals. Such conventional digital computers are used to process large two-dimensional image or array data only with great difficulty since, in general, point-by-point scanning or interrogation of the images or arrays is required to convert the image data to a serial data stream suitable for digital computer processing. In this invention two-dimensional radiant energy gate devices receive two input arrays and provide an output array having digital states dependent only on the digital states of the signal elements of the two input arrays at corresponding row and column positions. The logic devices include an array of photoconductors responsive to at least one of the input arrays for either selectively accelerating electrons to a phosphor output surface, applying potentials to an electro-luminescent output layer, exciting an array of discrete radiant energy sources, or exciting a liquid crystal to influence crystal transparency or reflectivity.



# ELECTROSTATICALLY CONTROLLED HEAT SHUTTER

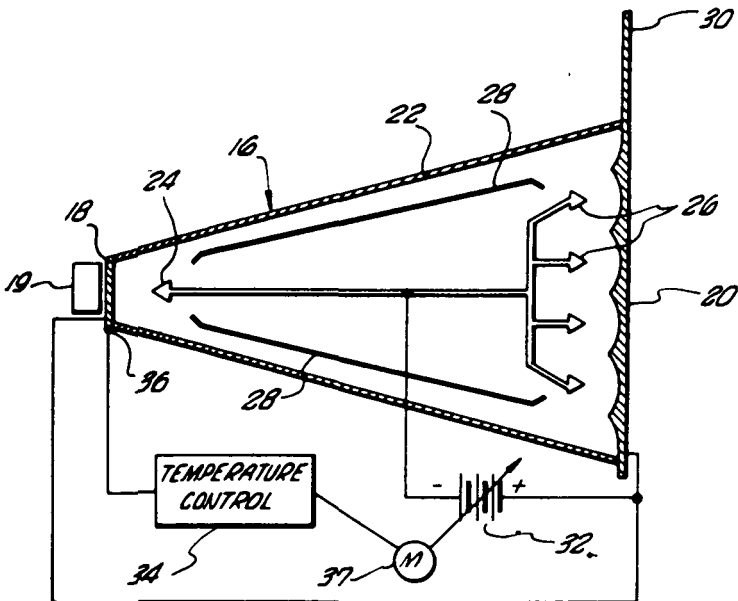
NASA Case No. NPO-11942  
Inventor: Lloyd T. Derr  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,763,928

Filed 6-28-72  
Issued 10-9-73

A heat transfer assembly for conducting thermal energy includes a hermetically sealed container enclosing a quantity of inert gas such as nitrogen. Two opposed walls of the container have high thermal conducting characteristics while the connecting walls have low thermal conducting characteristics. Electrodes are positioned adjacent the high thermal conducting walls and biased relative to the conducting walls to a corona potential for creating an ionic gas wind which must contact the conducting walls to be neutralized. The contact of the gas molecules permits the maximum thermal energy transfer between the walls. Baffles can be positioned adjacent the electrodes to regulate gas flow between the high thermal conducting surfaces.



## FABRICATION OF POLYCRYSTALLINE SOLAR CELLS ON LOW-COST SUBSTRATES

NASA Case No. GSC-12022  
No. GSC-12023

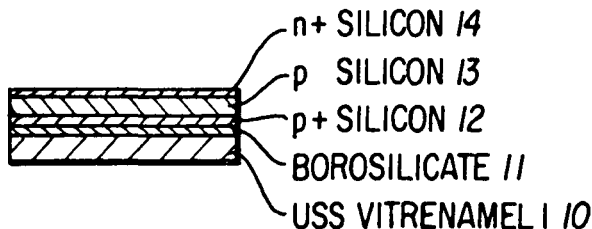
Inventor: Ting L. Chu  
Canada, \* Japan

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 3,961,997

Filed 5-12-75  
Issued 6-8-76

Low-cost polycrystalline silicon cells supported on substrates are prepared by depositing successive layers of polycrystalline silicon containing appropriate dopants over support substrates of a member selected from the group consisting of metallurgical-grade polycrystalline silicon, graphite and steel coated with a diffusion barrier of silica, borosilicate, phosphosilicate, or mixtures thereof such that p-n junction devices are formed which effectively convert solar energy to electrical energy.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.



# OPHTHALMIC LIQUEFACTION PUMP

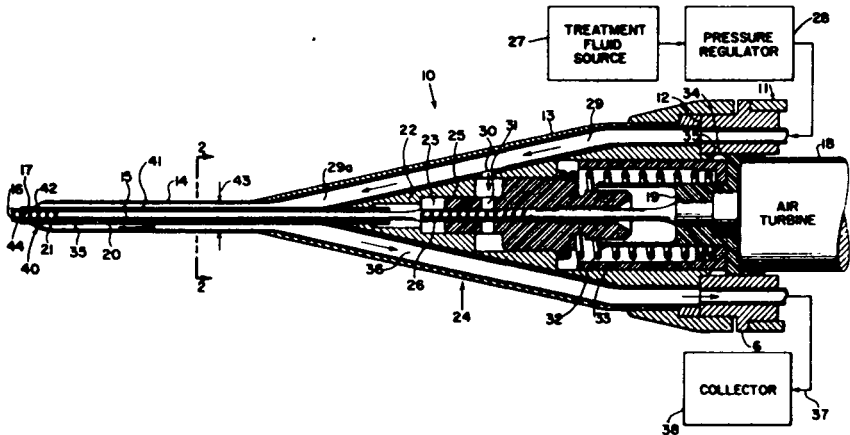
NASA Case No. LEW-12051  
Inventor: Edward F. Baehr, et al.  
Canada, Japan

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 3,906,954

Filed 9-14-73  
Issued 9-23-75

A surgical tissue macerating and removal tool is disclosed wherein a rotating member having a cutting tip is utilized. When the instrument is to be used in an eye, a treatment fluid is supplied to the operative site and a first pump is provided to evacuate macerated material and treatment fluid from the eye. A second pump means is provided on the rotating member to provide a counter flow of treatment fluid into the space between the rotating member and the support tube. The second pump may provide additional support for the rotating member. Means is also provided for axially positioning the rotating member to increase or decrease cutting action.



**CATALYTIC TRIMERIZATION OF AROMATIC NITRILES AND  
TRIARYL-S-TRIAZINE RING CROSS-LINKED HIGH  
TEMPERATURE RESISTANT POLYMERS AND COPOLYMERS  
MADE THEREBY**

**NASA Case No. LEW-12053-1  
Inventor: Li-Chen Hsu  
Canada, France, Great Britain,  
Japan, Sweden**

*Address inquiries to:*  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

*Corresponding to U.S. Patent No. 4,061,856*

*Filed 10-10-74  
Issued 12-6-77*

Prior trimerization methods are unsuitable for processing the aromatic nitrile-modified (terminated and/or appended) condensation-type prepolymers into s-triazine ring cross-linked high temperature resistant matrix resins for fiber reinforced composites. With this invention, aromatic nitrile such as p-cyanobenzoic acid and its esters, etc. can be directly trimerized to their corresponding triaryl-s-triazines at moderate temperature and pressure. Also, with this invention, the norborene groups on the addition-type polyimides are replaced by aromatic nitrile groups, or part of the monomeric reactants (aromatic diamines and tetracarboxylic acid dianhydride or their derivatives) of those soluble high molecular weight polyimides having relatively low thermal stability were replaced by nitrile appended aromatic diamines and aromatic tetracarboxylic acid dianhydrides or their derivatives. These terminating and/or appending aromatic nitrile groups are then catalytically trimerized to produce new triaryl-s-triazine ring containing or cross-linked polyimides which possess the outstanding thermal stability of both polyimides and aryl-s-triazines for continuous use at temperatures above 315°C.

# METHOD AND APPARATUS FOR SPLITTING A BEAM OF ENERGY

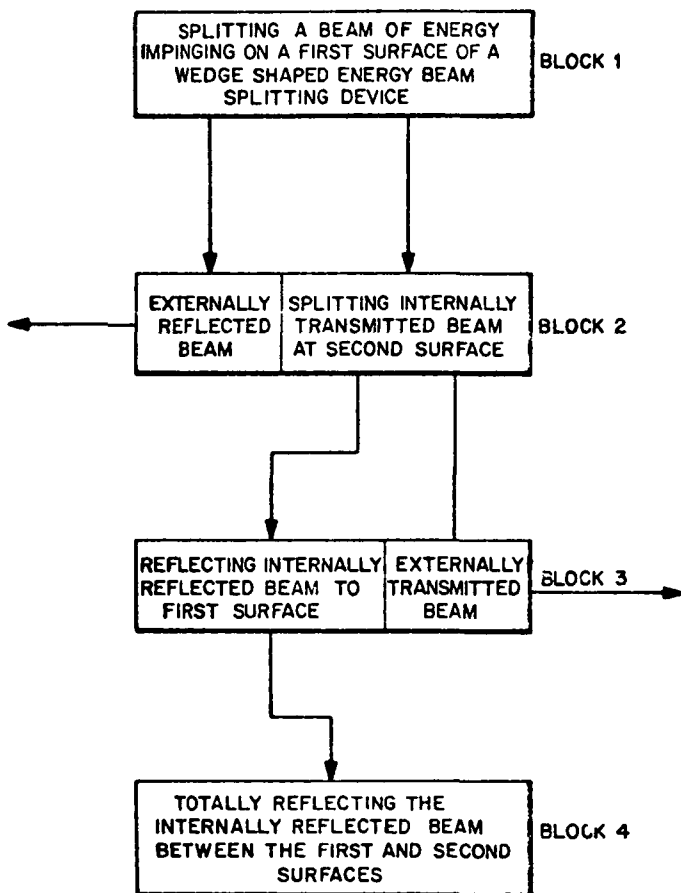
NASA Case No. GSC-12083  
Inventor: Walter R. Leeb  
Canada

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 4,093,354

Filed 12-23-75  
Issued 6-6-78

The present invention relates generally to a method and apparatus for splitting a communication laser beam into a pair of beams in a laser transmitter and for combining a carrier beam with a second beam to produce a pair of combined beams at a laser receiver. The invention is presently used in experimental laser system transmitters and receivers being developed for satellite use.



# NOZZLE EXTRACTION PROCESS AND HANDLEMETER FOR MEASURING HANDLE

NASA Case No. LAR-12147  
Inventor: Vernon L. Alley, et al.  
Canada

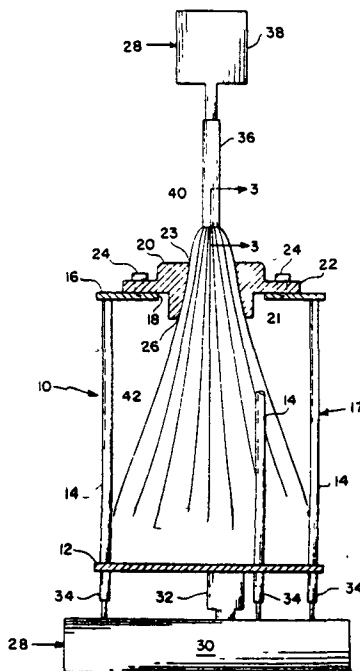
Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23365  
U.S.A.

Corresponding to U.S. Patent No. 4,103,550

Filed 10-19-76  
Issued 8-1-78

This invention relates to a method and apparatus for quantitatively determining the handle of fabrics and other flexible materials. Handle is a fabric term used to refer to the qualities of compressibilities, deapability, foldability, stiffness, pliability, etc., possessed by all fabrics and similar flexible materials. A material with good handle is usually soft to the touch, easily compressed and easily folded, whereas a material possessing poor handle qualities is stiff, crisp and boardy.

The present invention discloses a numerical quantity termed handle modulus (expressed in dimensions of force per unit area) by which the handle of a given flexible material sample may be directly compared with the handle of other materials which need not be presently available for comparison. In the past handle determination was subjective in whole or part and required direct subjective comparison between samples.



## PSEUDO CONTINUOUS WAVE INSTRUMENT

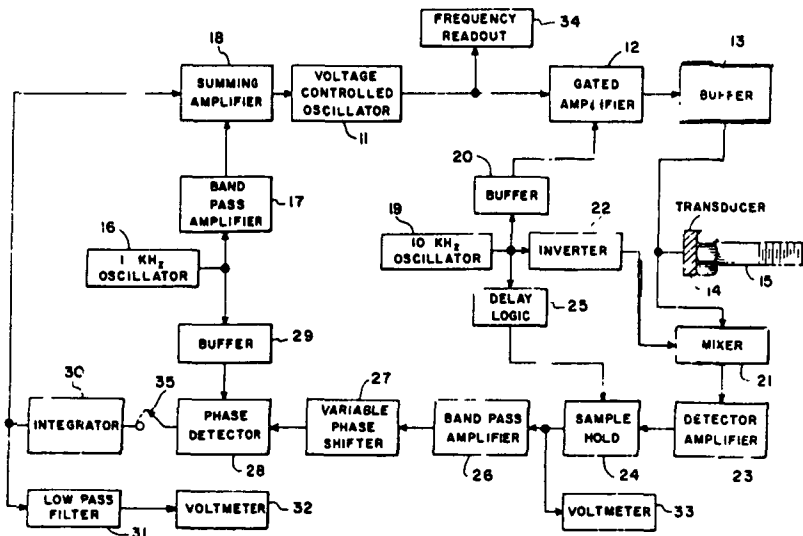
**NASA Case No. LAR-12260-1**  
**Inventor: Joseph S. Heyman**  
 Canada, France,  
 Great Britain, Japan,  
 Switzerland, West Germany

*Address inquiries to:*  
 Langley Research Center  
 Attn: Patent Counsel  
 Mail Code: 279  
 Langley Station  
 Hampton, VA 23365  
 U.S.A.

*Corresponding to U.S. Patent No. 4,117,731*

*Filed 12-8-77*  
*Issued 10-3-78*

A device for measuring acoustic properties and their changes in a sample. A variable frequency source is applied to the sample by means of a transducer to produce sound waves within the sample. The variable frequency source is periodically interrupted for a short duration. Means are connected to the transducer for receiving the resulting acoustic signals during the interruptions for producing a control signal indicative of a difference in the frequency of the output of the variable frequency source and the frequency of a mechanical resonant peak in the sample. The control signal is applied to the variable frequency source to maintain its output frequency at the frequency of the mechanical resonant peak. The change in frequency of the variable frequency source is indicative of the shift in frequency of the mechanical resonant peak and the amplitude of the acoustic signals is indicative of the attenuation of the acoustic signals in the sample.



# LOW INTENSITY X-RAY AND GAMMA-RAY IMAGING DEVICE

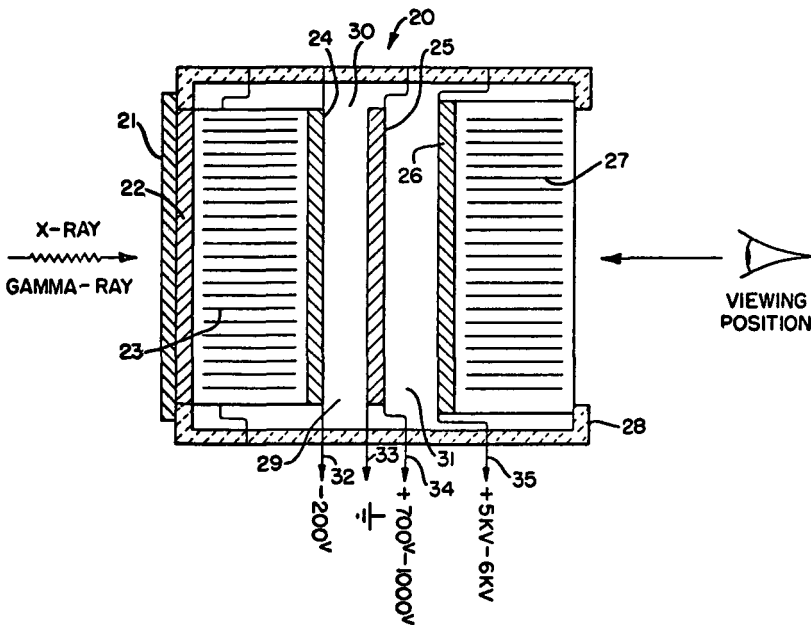
**NASA Case No. GSC-12263**  
**Inventor: Lo I. Yin**  
**Australia, Belgium, Canada,**  
**Denmark, Finland, France,**  
**Great Britain, Japan, Mexico,**  
**The Netherlands, Norway,**  
**Sweden, West Germany**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,142,101*

*Filed 7-20-77*  
*Issued 2-27-79*

A radiation to visible light converter is combined with a visible light intensifier. The converter is a phosphor or scintillator material which is modified to block ambient light. The intensifier includes fiber optics input and output face plates with a photocathode-microchannel plate amplifier-phosphor combination. Incoming radiation is converted to visible light by the converter which is piped into the intensifier by the input fiber optics face plate. The photocathode converts the visible light to electrons which are amplified by a microchannel plate amplifier. The electrons are converted back to light by a phosphor layer and piped out for viewing by the output fiber optics face plate. The converter-intensifier combination may be further combined with it's own radiation source or used with an independent source.



# FREE-PISTON REGENERATIVE HOT GAS HYDRAULIC ENGINE

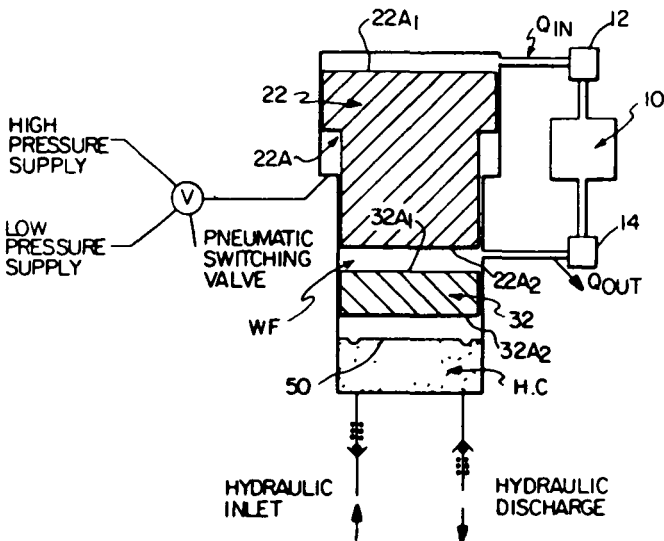
**NASA Case No. LEW-12274-1**  
**Inventor: Donald G. Beremand**  
**Canada, Japan, Great Britain,**  
**France, West Germany, Sweden,**  
**The Netherlands**

*Address inquiries to:*  
 Lewis Research Center  
 Attn: Patent Counsel  
 Mail Code: 60-2  
 21000 Brookpark Road  
 Cleveland, OH 44135  
 U.S.A.

*Corresponding to U.S. Patent No. 4,215,548*

*Filed 10-12-78*  
*Issued 8-5-80*

A free-piston regenerative hydraulic engine includes a displacer piston which is driven pneumatically by a high-pressure or low-pressure gas. The present invention includes an inertial mass such as a piston to effectively store and supply energy during portions of the cycle. Power is transmitted from the working fluid to a hydraulic fluid across a diaphragm to achieve a hydraulic power output. The displacer piston may be driven pneumatically, hydraulically or electromagnetically. The displacer piston and the inertial mass may be positioned on the same side of the diaphragm member or may be separated by the diaphragm member.



**METHOD OF IMPROVING IMPACT RESISTANCE  
OF CERAMIC BODIES, AND IMPROVED BODIES**

**NASA Case No. LEW-12301  
Inventor: Henry Paul Kirchner  
Canada**

*Address inquiries to:*  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

*Corresponding to U.S. Patent No. 3,953,636*

*Filed 4-24-74  
Issued 4-27-76*

A difficulty with the proposed uses of ceramic materials for such high temperature applications as the stator vanes in aircraft and stationary gas turbines, and rotating parts in automotive gas turbines is their relatively low impact resistance. This invention is a method of improving the impact resistance of bodies of polycrystalline ceramic such as alumina, silicon nitride and silicon carbide, and bodies produced by the method. The body is provided with a layer of a low elastic modulus polycrystalline ceramic material which has microcracks therein, formed by such factors as thermal expansion coefficient anisotropy, differences in thermal expansion coefficients between phases of the material, and by changes in volume during phase transformations in the material. The layer can be applied by preforming the layer and then applying, or by hot pressing the material of the layer onto the body.



## ALKALI-METAL SILICATE BINDERS AND METHODS OF MANUFACTURE

**NASA Case No. GSC-12303**  
**Inventor: John B. Schutt**  
**Australia, Canada, France,**  
**West Germany, Great Britain,**  
**Japan, The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

*Corresponding to U.S. Patent No. 4,162,169*

*Filed 12-21-77*  
*Issued 7-24-79*

A paint binder utilizing a potassium or sodium silicate dispersion having a silicon dioxide to alkali-metal oxide mol ratio of from 4.8:1 to 6.0:1, the binder exhibiting stability during both manufacture and storage. The process of making the binder is predictable and repeatable and the binder may be made with inexpensive components. The high mol ratio is achieved with the inclusion of a silicon dioxide hydrogel. The binder, which also employs a silicone, is in the final form of a hydrogel sol.

# CDS SOLID STATE PHASE INSENSITIVE ULTRASONIC TRANSDUCER

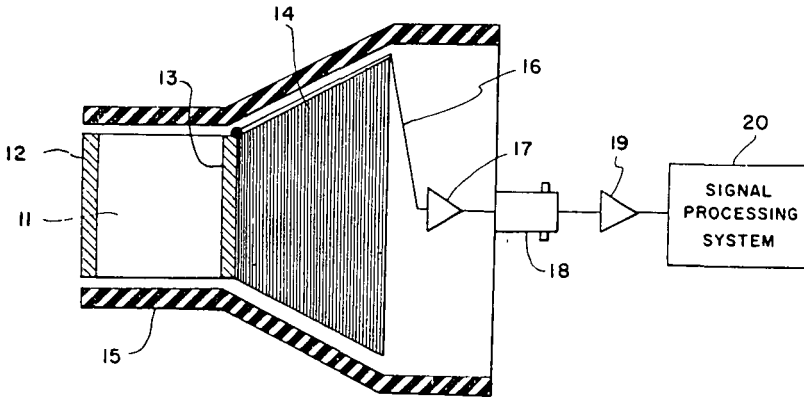
NASA Case No. LAR-12304-1  
Inventor: Joseph S. Heyman  
Canada

Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 4,195,244

Filed 12-21-77  
Issued 3-25-80

A phase insensitive ultrasonic transducer which includes a CdS crystal that is annealed for a selected period of time and at a selected temperature to provide substantially maximum acoustic attenuation at the operating frequency of the transducer. Two electrodes are attached to the crystal with amplifier means and a signal processing system connected to one of the electrodes to provide an ultrasonic receiver.



# CONTINUOUS SELF-LOCKING SPIRAL WOUND SEAL

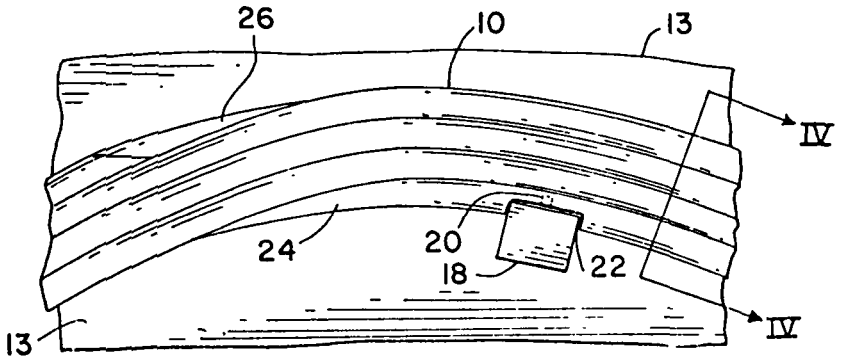
**NASA Case No. LAR-12315-1**  
**Inventor: Stephen C. Irick**  
**Canada, Japan, France,**  
**Germany, Italy, Sweden,**  
**Switzerland, Great Britain,**  
**The Netherlands**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent No. 4,309,039*

*Filed 11-20-79 •*  
*Issued 1-5-82*

A spiral wound seal for effecting a seal between two surfaces. The seal consists of a strip of gasket material wound into a groove machined into one of the surfaces. The gasket strip is wider than the groove is deep such that a portion of the gasket material protrudes from the groove. The seal is effected by clamping the second surface onto the first surface and thereby compressing the protruding gasket material.



## GELS AS BATTERY SEPARATORS FOR SOLUBLE ELECTRODE CELLS

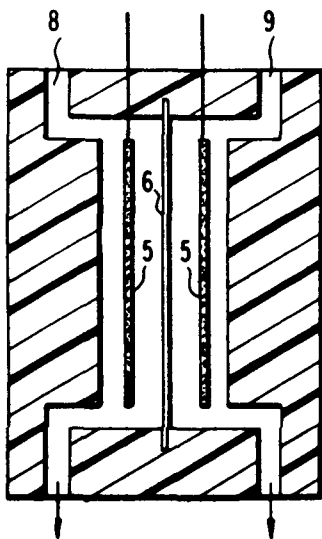
NASA Case No. LEW-12364-1  
Inventor: Dean W. Sheibly, et al.  
Australia, Canada, France,  
Great Britain, Italy, \* Japan,  
West Germany

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,018,971

Filed 7-20-76  
Issued 4-19-77

Gels are formed from silica powders and hydrochloric acid. The gels can then be impregnated into a polymeric foam and the resultant sheet material can then be used in applications where the transport of chloride ions is desired. Specifically disclosed is the utilization of the sheet in electrically rechargeable redox flow cells which find application in bulk power storage systems.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

# MICROWAVE FIELD EFFECT TRANSISTOR

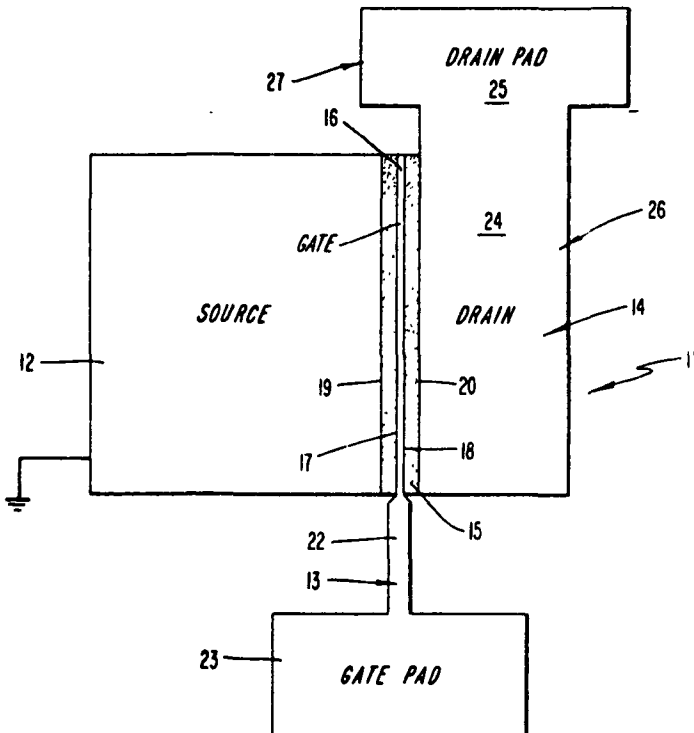
NASA Case No. GSC-12,442-1  
Inventor: Ho-Chung Huang  
Canada, Japan, Ireland,  
South Korea, Taiwan, Belgium,  
France, West Germany, Great  
Britain, Italy, The Netherlands,  
Sweden, Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent Application No. 327,659

Filed 12-4-81

The invention is a new and improved, high power, microwave GaAs FET which minimizes losses in impedance matching networks and inactive zones (electrode segments that are not superimposed on an active region) of the FET by limiting the total active area of each unit cell of the FET and by matching or partially matching the impedances of each unit cell to the source and load if a plurality of unit cells are combined in a single device having the usual external source, drain and gate electrodes. To minimize losses in the inactive zones of each device, matching networks are physically located immediately adjacent the GaAs active region of the high power, microwave GaAs FET and are actually part of the FET electrodes. By placing the matching networks within the device and immediately adjacent the active region, the area and therefore losses of the inactive zone are minimized.



# LINEAR MAGNETIC BEARING

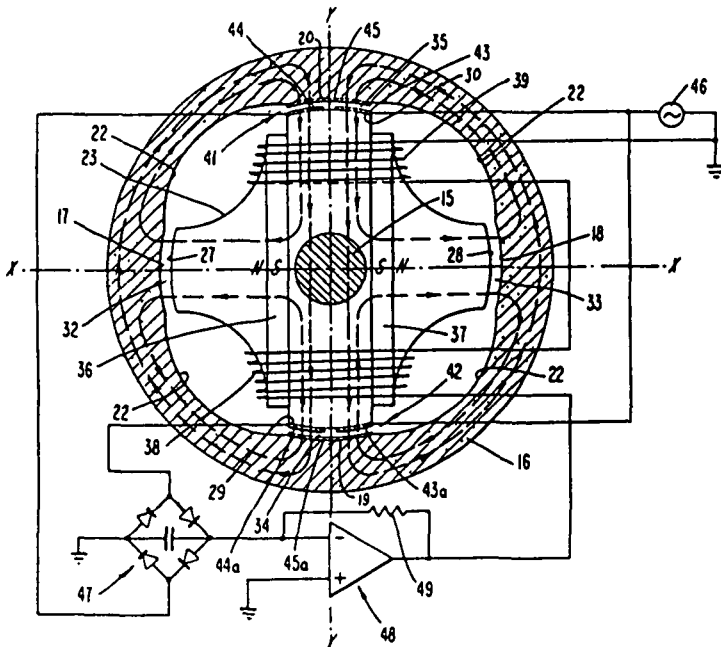
**NASA Case No. GSC-12,517-1**  
**Inventor: Philip A. Studer**  
**Australia, Canada, Ireland,**  
**Japan, Belgium, France,**  
**West Germany, Great Britain,**  
**Italy, The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,387,935*

*Filed 12-8-80*  
*Issued 6-14-83*

A linear magnetic bearing having mutually orthogonal x, y and z axes comprises a stationary stator member and a relatively long movable member. The movable member is controlled so that it is centered on the z axis. One of the members includes permanent magnet means for positioning the movable member relative to the stationary member. A sensor controls electro-magnet means on one of the members, to center the longitudinal axis of the movable member on the z axis. A radial air gap is established between the members. The members include means for establishing first low reluctance magnetic flux paths for the permanent magnet means through both of the members and the air gap and second low reluctance magnetic flux paths for the electro-magnet means through both of the members and the air gap so that no net forces are applied to the movable member in the direction of the z axis by either the permanent magnet means or the electro-magnet means. The first and second low reluctance flux paths are arranged so that flux from the electro-magnet means does not flow through the high reluctance permanent magnet means.



# A LINEAR MAGNETIC MOTOR/GENERATOR

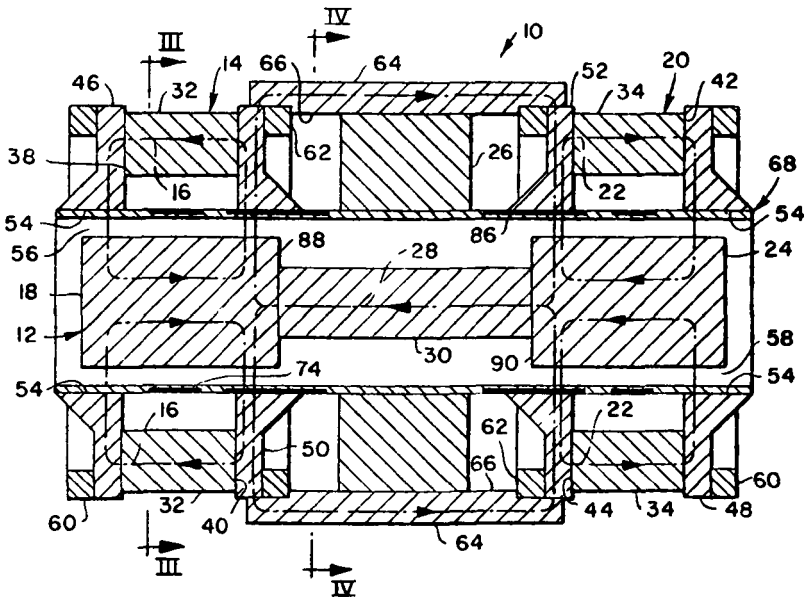
**NASA Case No. GSC-12518-1**  
**Inventor: Philip A. Studer**  
**Canada, Japan, Ireland, France,**  
**Italy, West Germany, Sweden,**  
**Switzerland, Belgium,**  
**Great Britain, The Netherlands**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,315,197*

*Filed 2-7-80*  
*Issued 2-9-82*

The linear magnetic motor/generator includes an axially movable actuator mechanism. A permanent magnet mechanism defines a first magnetic flux path which passes through a first end portion of the actuator mechanism. Another permanent magnet mechanism defines a second magnetic flux path which passes through a second end portion of the actuator mechanism. A drive coil defines a third magnetic flux path passing through a third central portion of the actuator mechanism. A drive coil selectively adds magnetic flux to and subtracts magnetic flux from magnetic flux flowing in the first and second magnetic flux paths and, respectively, for supplying an axial force to the actuator mechanism.



# INDUCTION HEATING GUN

NASA Case No. LAR-12540-1  
Inventor: John D. Buckley, et al.  
Canada, Japan, Australia,  
West Germany, Switzerland,  
Great Britain, France,  
Sweden, The Netherlands

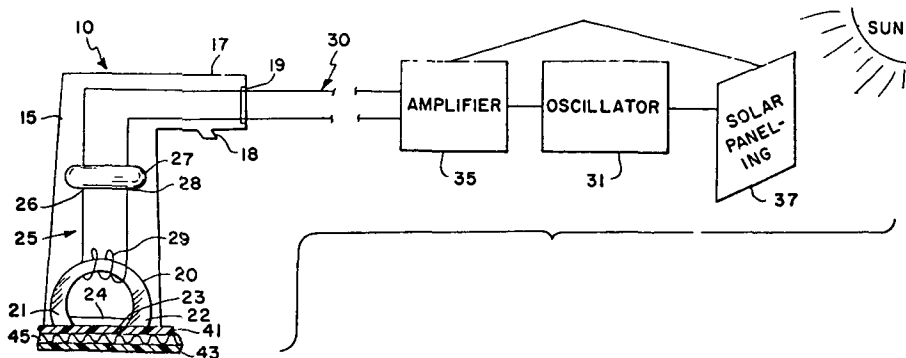
Address inquiries to:  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

Corresponding to U.S. Patent No. 4,521,659

Filed 8-24-79

Issued 6-4-85

A device for inductively heating and fusing thermoplastics comprising an alternating current passing through a tank circuit, the inductor member of the tank circuit being wrapped around a curved pole piece of a ferromagnetic material. The magnetic flux of the inductor coil member flows to the ends of the pole piece and into a screen placed between the materials to be joined. The flux induces a current in the screen, and heat is generated to melt the thermoplastics together. Because only 30-150 watts of power are passed through the tank circuit, a wire which will remain cool under operational wattage may be selected, making air or fluid cooling unnecessary.





## LADDER SUPPORTED RING BAR CIRCUIT

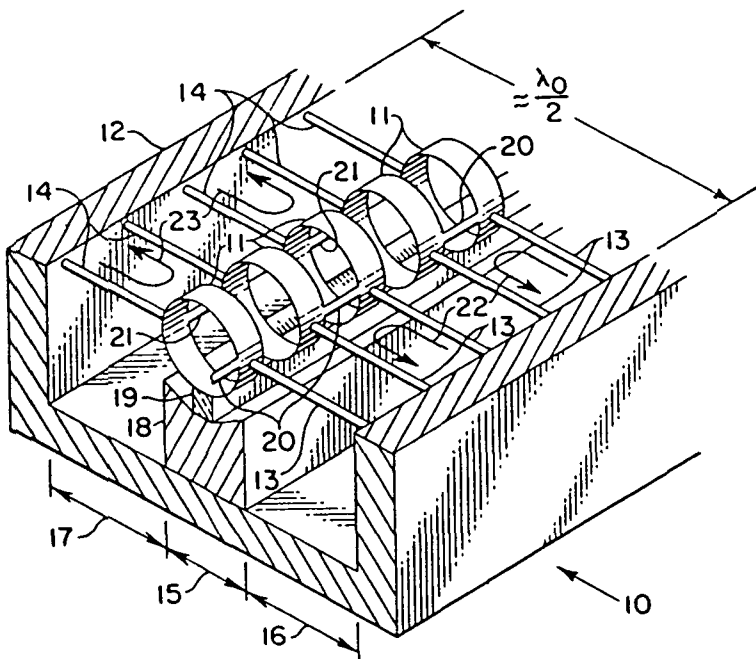
NASA Case No. LEW-13,570-1  
Inventor: Henry G. Kosmahl  
Canada, Ireland, Japan,  
Belgium, France, West Germany,  
Great Britain, Italy,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,422,012

Filed 4-3-81  
Issued 12-20-83

An improved slow wave circuit especially useful in backward wave oscillators includes a slow wave circuit (10) in a waveguide (12). The slow wave circuit is comprised of rings 11 disposed between and attached to respective stubs (13, 14). The stubs (13, 14) are attached to opposing sidewalls of the waveguide (12). To the end that opposed, interacting magnetic fields will be established to provide a very high coupling impedance for the slow wave structure, axially orientated bars (20) are connected between rings in alternate spaces and adjacent to the attachment points of stubs 13. Similarly, axial bars (21) are connected between rings in the spaces which do not include bars (20) and at points adjacent to the attachments of bars (21).



# LINEAR MAGNETIC BEARINGS

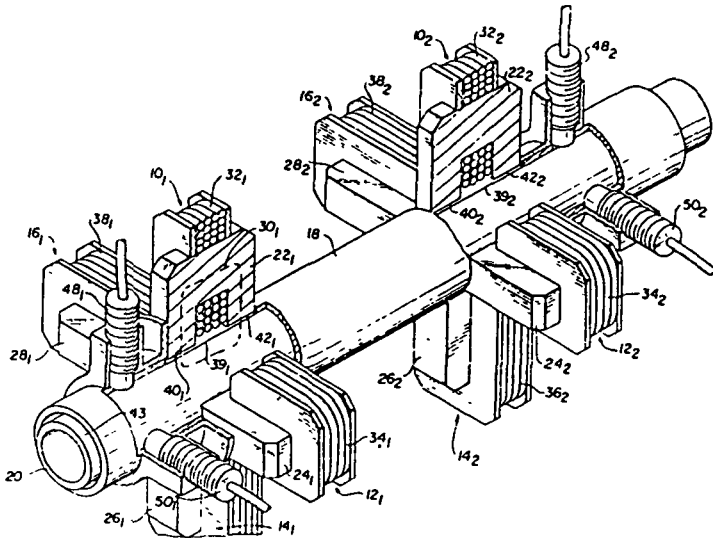
NASA Case No. GSC-12,582-1  
Inventor: Michael P. Goldowsky  
Australia, Canada, Ireland,  
Japan, Belgium, France,  
West Germany, Great Britain,  
Italy, The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 4,473,259

Filed 12-24-80  
Issued 9-25-84

A linear magnetic bearing is provided which has an elongated housing for containing a shaft type armature with quadrature positioned shaft position sensors and equidistantly positioned electromagnets located at each end of the housing. Each set of sensors is responsive to orthogonal displacement of the armature and is utilized to generate control signals to energize the electromagnets to center the armature. A bumper magnet assembly is located at one end of the housing for dampening any undesired axial movement of the armature.



# LOW INTENSITY X-RAY AND GAMMA-RAY IMAGING SPECTROMETER

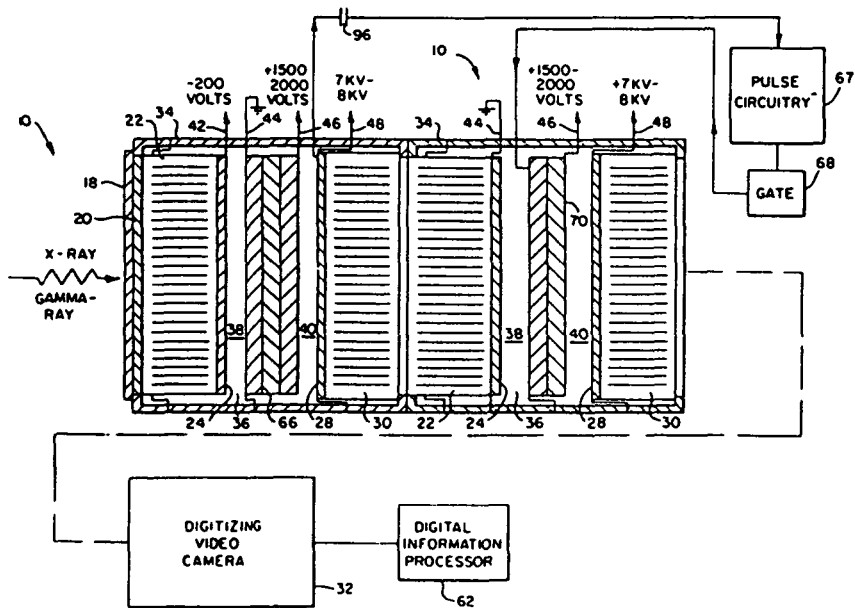
**NASA Case No. GSC-12,587-1**  
**Inventor: Lo I Yin**  
**Australia, Canada, Denmark,**  
**Finland, Japan, Mexico,**  
**Norway**

*Address inquiries to:*  
 Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

*Corresponding to U.S. Patent No. 4,345,153*

*Filed 7-30-80*  
*Issued 8-17-82*

A low intensity X-ray and gamma-ray spectrometer 10 is disclosed for imaging, counting, and energy resolving of single invisible radiation particles. Spectrometer 10 includes a converting device 20 for converting single invisible radiation particles to visible light photons. Another converting device 24 converts the visible light photons to photoelectrons. A fiber optics coupling device 22 couples together converting devices 20 and 24. An intensifying device 26 intensifies the photoelectrons by an average gain factor of substantially  $10^4$ - $10^7$ . Intensifying device 26 is an anti-ion feedback microchannel plate amplifier which is operated substantially below saturation. A displaying device 32 displays the intensified photoelectrons. Displaying device 32 indicates the spatial position, number, and energy of the incoming single invisible radiation particles.



## SURFACE FINISHING

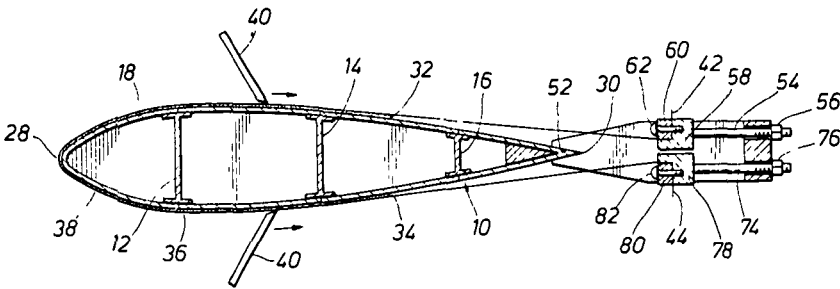
NASA Case No. MSC-12631  
Inventor: Jack Albert, et al.  
Canada

Address inquiries to:  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AM  
Houston, TX 77058  
U.S.A.

Corresponding to U.S. Patent No. 4,032,089

Filed 4-16-75  
Issued 6-28-77

A surface of an article adapted for relative motion with a fluid environment is finished by coating the surface with a fluid adhesive, covering the adhesive with a sheet of flexible film material under tension, and setting the adhesive while maintaining tension on the film material whereby the tensioned film material is bonded to the surface by the adhesive.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

## LIGHTWEIGHT ELECTRICALLY-POWERED FLEXIBLE LAMINATE

NASA Case No. MSC-12662  
Inventor: Frederic S. Dawn, et al.  
Canada

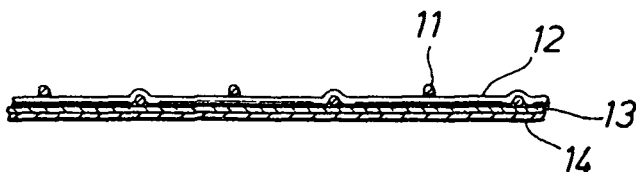
Address inquiries to:  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AM  
Houston, TX 77058  
U.S.A.

Corresponding to U.S. Patent 4,107,363

Filed 1-14-75  
Issued 8-15-78

The invention relates to a lightweight heater fabric, and more particularly to an active thermal control mechanism for localized controlled heating in vacuum and non-vacuum environments. The fabric consists of two sets of yarns, woven or non-woven, in which one set of the yarns is composed of flexible, electrically conductive metal fibers capable of being resistance heated by the application of electrical voltage. The remaining set of yarns is electrically non-conductive and is used to provide mechanical strength as well as to preclude passage of electrical current between the metal yarns. The non-conductive yarns assure that minimum spacing between metal yarns is maintained.

A lightweight, electrically non-conductive plastic film is bonded to the yarns. This sheet-like film protects the metal yarns from the elements (minimizes electrical shorts from moisture, rain or dew), provides additional structural strength, and prevents convective loss of heat in non-vacuum applications. The film is metalized on its obverse side with a metal surface which provides for a more uniform heat load distribution.



## IMAGING X-RAY SPECTROMETER

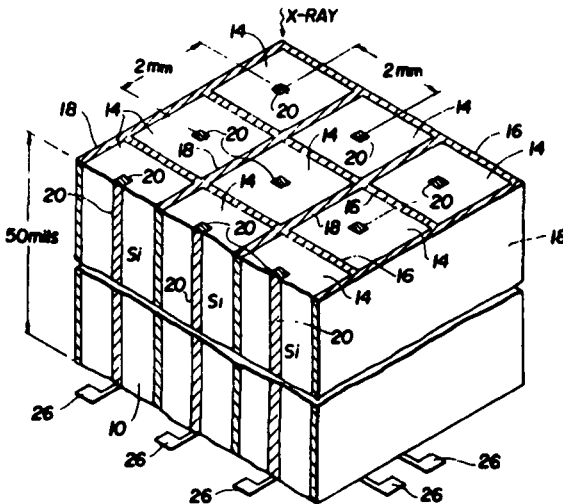
NASA Case No. GSC-12,682-1  
Inventor: George E. Alcorn, et al.  
Canada, Japan, Ireland,  
Belgium, France, West Germany  
Great Britain, Italy,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 4,472,728

Filed 2-19-82  
Issued 9-18-84

An X-ray spectrometer for providing imaging and energy resolution of an X-ray source comprised of a thick silicon wafer (10) having an embedded matrix or grid of aluminum completely through the wafer fabricated, for example, by thermal migration. The aluminum matrix defines the walls (16, 18) of a rectangular array of silicon X-ray detector cells (14) or "pixels". A thermally diffused aluminum electrode (20) is also formed centrally through each of the silicon cells (14) with biasing means (22, 26, 28) being connected to the aluminum cell walls (16, 18) and the centralized aluminum electrode (20) for causing lateral charge carrier depletion between the cell walls so that incident X-ray energy causes a photo-electric reaction within the silicon producing collectible charge carriers in the form of electrons which are collected and used for imaging.



## STIRLING CYCLE CRYOGENIC COOLER

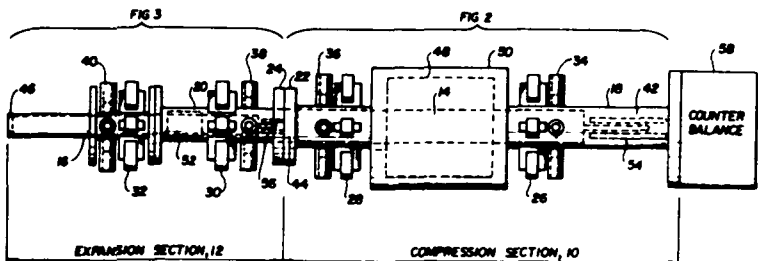
NASA Case No. GSC-12,697-1  
Inventor: Max G. Gasser, et al.  
Australia, Canada, Ireland,  
Israel, Japan, Belgium,  
France, West Germany,  
Great Britain, Italy,  
Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 4,389,849

Filed 10-2-81  
Issued 6-28-83

An apparatus comprising a reciprocally movable body located in a body housing containing a working fluid. A drive motor is coupled to the body for effecting reciprocation of the body within the housing to selectively compress and expand the working fluid. A non-contacting bearing is located on the housing and is operable to center the body in the housing. A non-contacting reduced clearance region between the body and housing restricts undesired flow of the working fluid around the body. The non-contacting bearing and the non-contacting reduced clearance region are operable to eliminate physical contact between the body and the housing.



# INTRA-OCULAR PRESSURE NORMALIZATION TECHNIQUE AND EQUIPMENT

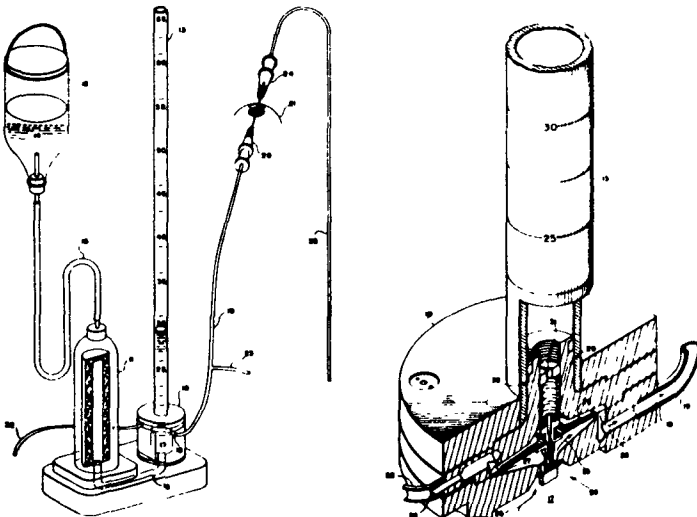
NASA Case No. LEW-12723-1  
Inventor: William J. McGannon  
France, Great Britain, Italy,  
Japan, The Netherlands,  
Germany

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,184,491

Filed 8-31-77  
Issued 1-22-80

A method and apparatus for safely reducing abnormally high intra-ocular pressure in an eye during glaucoma surgery. A pressure regulator of the spring-biased diaphragm type is provided with additional bias by a column of liquid. The height of the column of liquid is selected such that the pressure at a hypodermic needle connected to the output of the pressure regulator is equal to the measured pressure of the eye. The hypodermic needle can be safely inserted into the anterior chamber of the eye. Liquid is bled out of the column to reduce the bias on the diaphragm of the pressure regulator and the output pressure of the regulator. This lowering pressure of the regulator also occurs in the eye by means of a small second bleed path provided between the pressure regulator and the hypodermic needle.





# PROCESS FOR PREPARING HIGH TEMPERATURE POLYIMIDE FILM LAMINATES

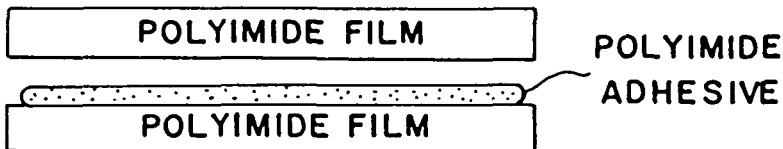
NASA Case No. LAR-12,742-1  
Inventor: Anne K. St. Clair, et al.  
Belgium, France, West Germany,  
Great Britain, Italy,  
The Netherlands, Sweden,  
Canada, Japan

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent No. 4,543,295*

*Filed 9-22-80  
Issued 9-24-85*

A process for fabricating large area void-free polyimide laminate structures wherein multiple ply polyimide film laminates may be constructed without decreasing the individual film strength and wherein layers of metal foil may be laminated between polyimide film layers to yield a flexible high temperature resistant structure having capabilities for use as flexible electric circuits in aerospace applications and the like.



# INTEGRATED PHOTO-RESPONSIVE METAL OXIDE SEMICONDUCTOR CIRCUIT

NASA Case No. GSC-12,782-1

**Inventor: Murzban D. Jhabvala, et al.**  
 Canada, Japan, South Korea,  
 Taiwan, Belgium, France,  
 West Germany, Great Britain,  
 Italy, The Netherlands, Sweden,  
 Switzerland

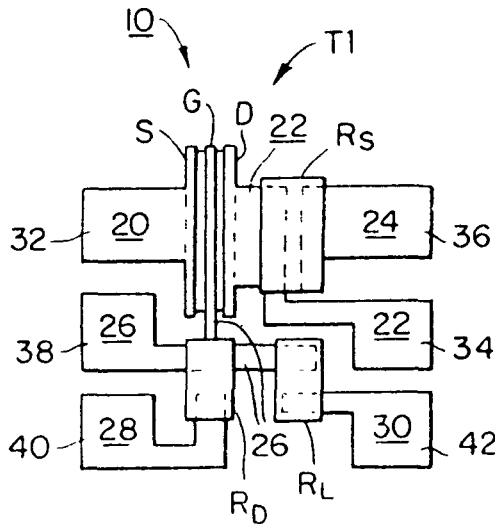
*Address inquiries to:*

Goddard Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: 204  
 Greenbelt, MD 20771  
 U.S.A.

*Corresponding to U.S. Patent Application No. 399,074*

*Filed 7-16-82*

An infrared photo-responsive element ( $R_D$ ) is monolithically integrated into a source follower circuit of a metal oxide semiconductor device (10) by depositing a layer of a lead chalcogenide as a photo-resistive element forming an ohmic bridge between two metallization strips (26, 28) serving as electrodes of the circuit. Voltage from the circuit varies in response to illumination of the layer by infrared radiation.



## HIGH VOLTAGE ISOLATION TRANSFORMER

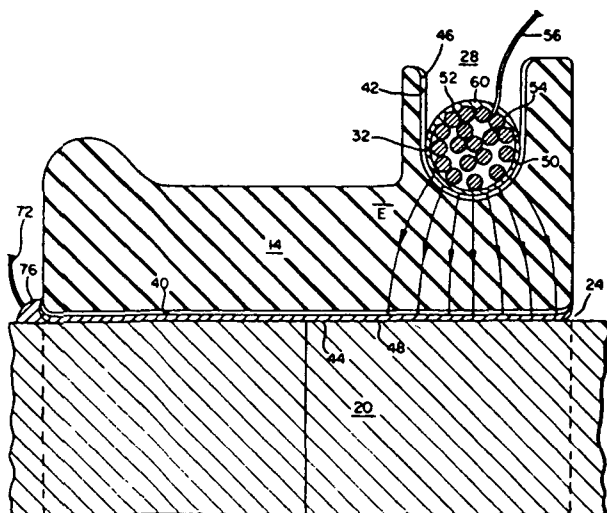
NASA Case No. GSC-12,817-1  
Inventor: Carroll H. Clatterbuck, et al.  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, Israel, Japan,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent No. 4,510,476

Filed 6-21-83  
Issued 1-9-85

A high voltage isolation transformer is provided with primary and secondary coils separated by discrete electrostatic shields from the surfaces of insulating spools on which the coils are wound. The electrostatic shields are formed by coatings of a compound having a low electrical conductivity which completely encase the coils and adhere to the surfaces of the insulating spools adjacent to the coils. Coatings of the compound also line axial bores of the spools, thereby forming electrostatic shields separating the spools from legs of a ferromagnetic core extending through the bores. The transformer is able to isolate a high constant potential applied to one of its coils, without the occurrence of sparking or corona, by coupling the coatings lining the axial bores to the ferromagnetic core and by coupling one terminal of each coil to the respective coating encasing the coil.



## HIGH VOLTAGE POWER SUPPLY

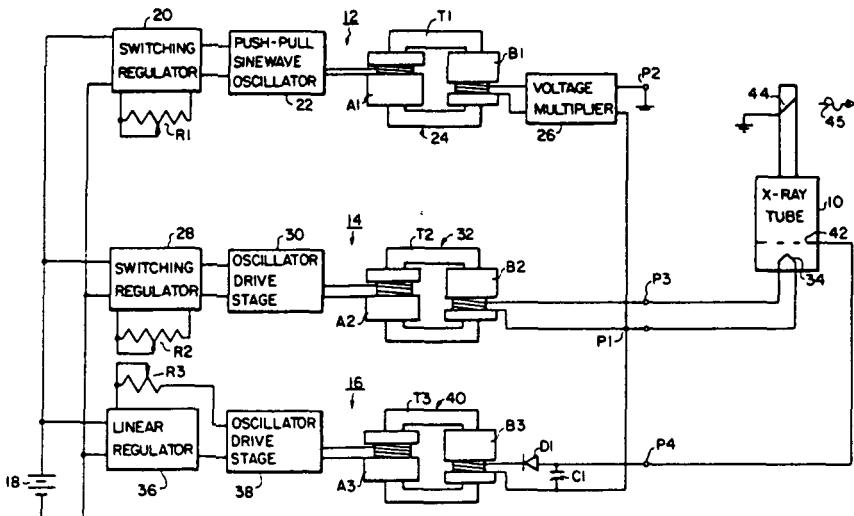
**NASA Case No. GSC-12,818-1**  
**Inventor: Arthur P. Ruitberg, et al.**  
**Australia, Belgium, Canada,**  
**France, West Germany, Great**  
**Britain, Italy, Israel, Japan,**  
**The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,517,472*

*Filed 7-6-83*  
*Issued 5-14-85*

A high voltage power supply is formed by three discrete circuits energized by a battery to provide a plurality of concurrent output signals floating at a high output voltage on the order of several tens of kilovolts. Each circuit has a regulator stage. In the first two circuits, the regulator stages are pulse width modulated and include adjustable resistances for varying the duty cycles of pulse trains provided to corresponding oscillator stages while the third regulator stage includes an adjustable resistance for varying the amplitude of a steady signal provided to a third oscillator stage. In the first circuit, the oscillator formed by a constant current drive network and a tuned resonant network including a step-up transformer, is coupled to a second step-up transformer which, in turn, supplies an amplified sinusoidal signal to a parallel pair of complementary poled rectifying, voltage multiplier stages to generate the high output voltage. Each of the other two circuits include oscillator drive stages which, together with isolation transformers, provide output signals floating at the high output voltage.



# THREE-DIMENSIONAL AND TOMOGRAPHIC IMAGING DEVICE FOR X-RAY AND GAMMA-RAY EMITTING OBJECTS

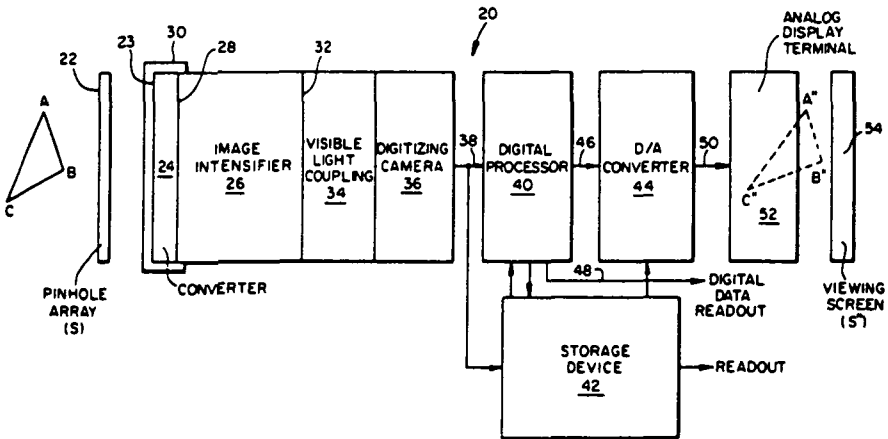
**NASA Case No. GSC-12,851-1**  
**Inventor: Lo I. Yin**  
**Australia, Belgium, Canada,**  
**France, West Germany, Great**  
**Britain, Italy, Israel, Japan,**  
**The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
**Goddard Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: 204**  
**Greenbelt, MD 20771**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,521,688*

*Filed 1-21-83*  
*Issued 6-4-85*

An instrument for obtaining quantitative, three-dimensional and tomographic information relating to x-ray and gamma-ray emitting objects and for the orthoscopic viewing of such objects. The output of the image intensifier is digitized by a digitizing camera in terms of position and intensity and fed into a digital computer. The computer may output quantitative information relating to the emitting object directly, such as that relating to tomograms, or provide information in analogue form when coupled with a suitable viewing device to give an orthoscopic, three-dimensional image of the object.



# INTRA-OCULAR PRESSURE NORMALIZATION TECHNIQUE AND EQUIPMENT

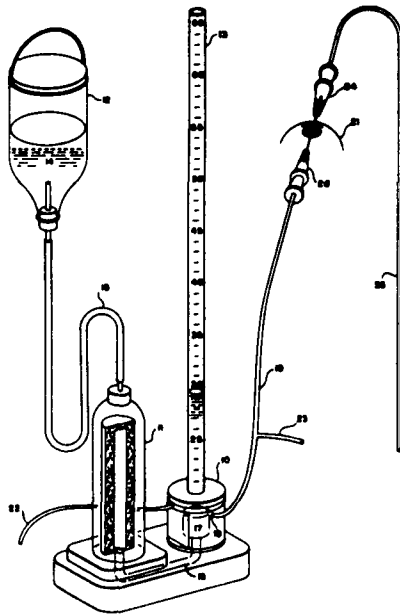
NASA Case No. LEW-12955-1  
Inventor: Edward F. Baehr  
Canada, France,  
Italy, Japan, The Netherlands,  
Sweden

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,157,718

Filed 8-31-77  
Issued 6-12-79

A method and apparatus for safely reducing abnormally high intra-ocular pressure in an eye during glaucoma surgery. A pressure regulator of the spring-biased, diaphragm type is provided with additional bias by a column of liquid. The height of the column of liquid is selected such that the pressure at a hypodermic needle connected to the output of the pressure regulator is equal to the measured pressure of the eye. The hypodermic needle can be safely inserted into the anterior chamber of the eye. Liquid is bled out of the column to reduce the bias on the diaphragm of the pressure regulator and, the output pressure of the regulator. This lowering pressure of the regulator also occurs in the eye by means of a small second bleed path provided between the pressure regulator and the hypodermic needle.



## METHOD OF FABRICATING AN IMAGING X-RAY SPECTROMETER

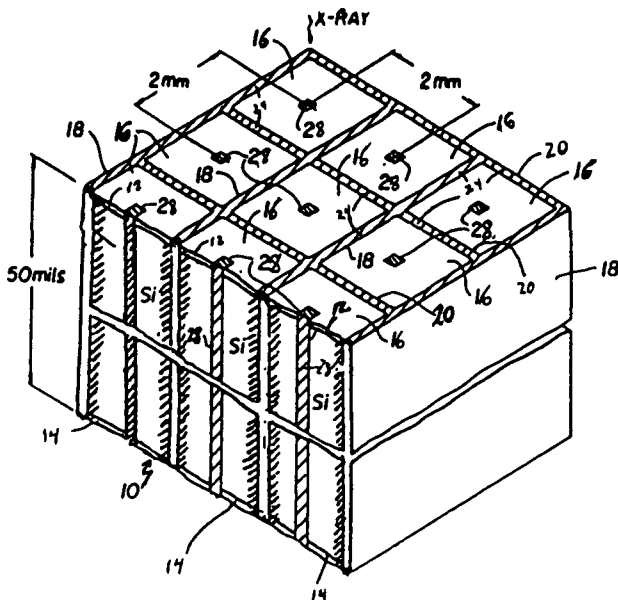
NASA Case No. GSC-12,956-1  
Inventor: George E. Alcorn, et al.  
Belgium, Canada, France  
West Germany, Great Britain,  
Italy, Ireland, Japan,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Goddard Space Flight Center  
Attn: Patent Counsel  
Mail Code: 204  
Greenbelt, MD 20771  
U.S.A.

Corresponding to U.S. Patent Application No. 745,977

Filed 6-18-85

A process for fabricating an X-ray spectrometer having imaging and energy resolution of X-ray sources. The spectrometer has an array of adjoining rectangularly shaped detector cells formed in a silicon body. The walls of the cells are created by laser drilling holes completely through the silicon body and diffusing  $n^+$  phosphorous doping material therethrough. A thermally migrated aluminum electrode is formed centrally through each of the cells.



## DUAL DIFFERENTIAL INTERFEROMETER

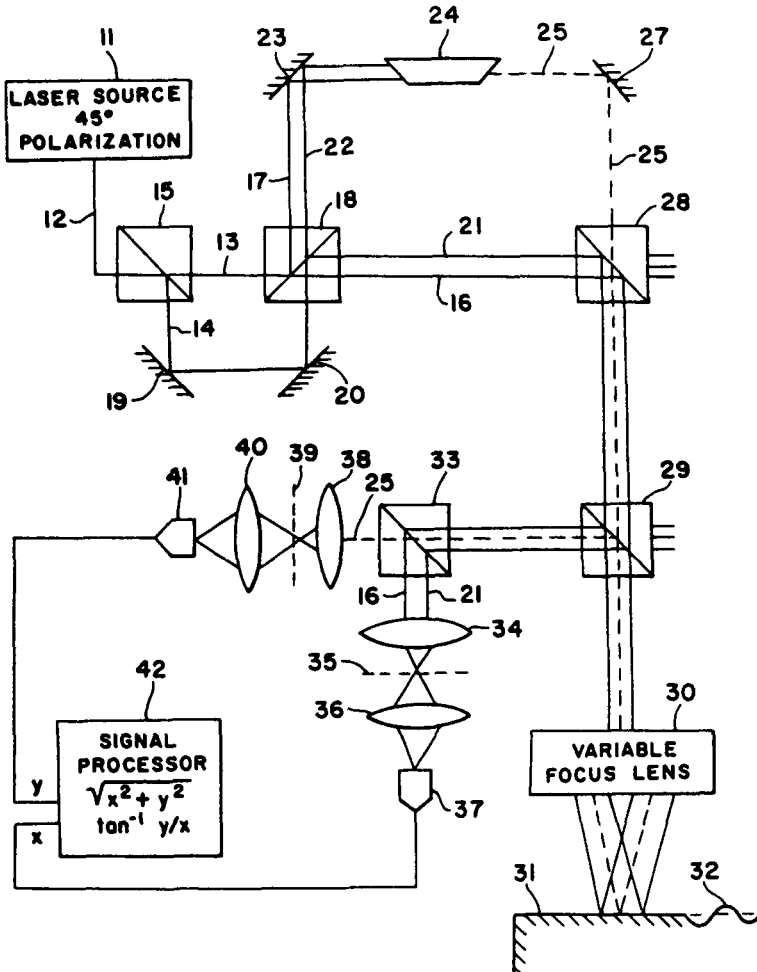
**NASA Case No. LAR-12,966-1**  
**Inventor: Richard O. Claus, et al.**  
**Belgium, Canada, France,**  
**West Germany, Great Britain,**  
**Italy, Japan, The Netherlands,**  
**Sweden, Switzerland**

*Address inquiries to:*  
**Langley Research Center**  
**Attn: Patent Counsel**  
**Mail Code: 279**  
**Langley Station**  
**Hampton, VA 23665**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,512,661*

*Filed 9-2-82*  
*Issued 4-23-85*

A dual two-beam differential interferometer that measures both the amplitude and orientation of propagating, broadband surface acoustic waves. Four beams are focused on a surface. The four reflected beams are separated into two pairs. The two pairs are detected to produce two signals that are used to compute amplitude and orientation.





**POLYPHENYLENE ETHERS WITH IMIDE  
LINKING GROUPS**

**NASA Case No. LAR-12,980-1  
Inventor: Terry St. Clair, et al.  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, India, Israel, Italy,  
Japan, The Netherlands,  
Sweden, Switzerland**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent No. 4,444,979*

*Filed 2-25-83  
Issued 4-24-84*

Novel polyphenylene ethers with imide linking units are disclosed. These polymers incorporate the solvent and thermal resistance of polyimides and the processability of polyphenylene ethers. Improved physical properties over those of the prior art are obtained by incorporating meta linked ethers and/or polyphenylene oxides into the polymer backbone. A novel process for making polymers of this type is also disclosed. The process is unique in that the expected need of high process temperatures and/or special atmospheres are eliminated.

# ZERO TORQUE GEAR HEAD WRENCH

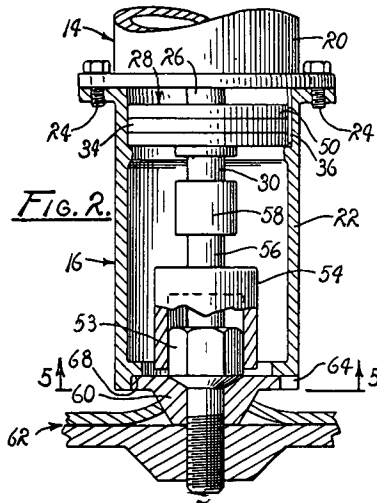
NASA Case No. NPO-13059  
Inventor: Allan R. McDougal, et al.  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,942,298

Filed 10-10-74  
Issued 3-9-76

Difficulties are often encountered in spacecraft assembly operations because of the existence of torsional stresses induced as a consequence of the tightening of certain bolts employed during such assembly operations. The present invention is a gear head wrench for applying torque to bolts without transferring torsional stresses to bolt-receiving structures. The wrench has an outer housing adapted to be coupled with a spacer interposed between the bolt head and the juxtaposed surface of the bolt-receiving structure for applying a balancing counter-torque to the spacer as torque is applied to the bolt head whereby the bolt-receiving structure is substantially isolated from torsional stress.



# ION BEAM SPUTTER-ETCHED VENTRICULAR CATHETER FOR HYDROCEPHALUS SHUNT

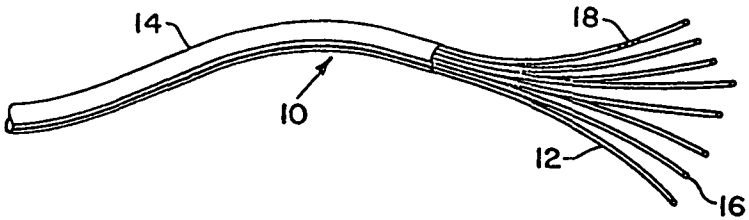
NASA Case No. LEW-13,107-1  
Inventor: Bruce A. Banks  
Canada, Japan, Belgium,  
France, West Germany,  
Great Britain, Italy,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,377,169

Filed 6-10-81  
Issued 3-22-83

This invention is directed to an improved cerebrospinal fluid shunt in the form of a ventricular catheter for controlling the condition of hydrocephalus by relieving the excessive cerebrospinal fluid pressure. The invention is further concerned with an improved method of shunting the cerebral fluid from the cerebral ventricles to other areas of the body.



## CATALYST SURFACES FOR THE CHROMOUS/CHROMIC REDOX COUPLE

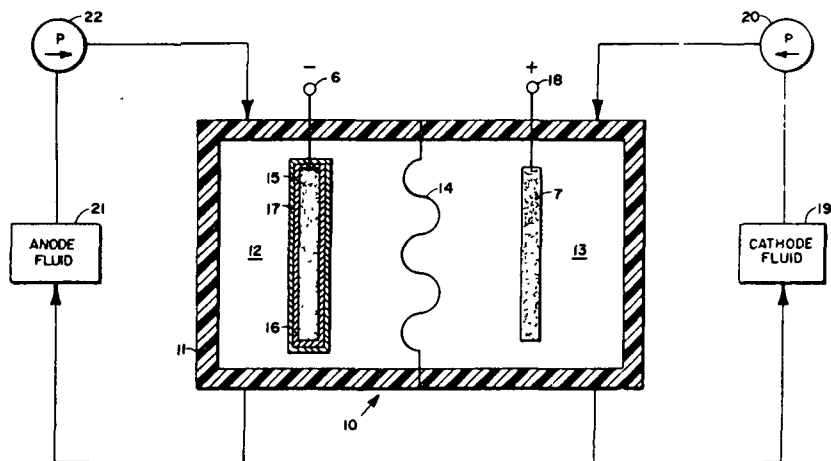
NASA Case No. LEW-13148-1  
Inventor: Jose D. Giner, et al.  
Canada, Japan, Germany,  
France, Switzerland, Great  
Britain, Sweden, The Netherlands

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,192,910

Filed 11-29-78  
Issued 3-11-80

There is disclosed an electricity producing cell of the reduction-oxidation (REDOX) type divided into two compartments by a membrane, each compartment containing a solid inert electrode. A ferrous/ferric couple in a chloride solution serves as a cathode fluid. A chromic/chromous couple in a chloride solution serves as an anode fluid. The electrode is an electrically conductive, inert material plated with copper, silver or gold. A thin layer of lead plates onto the copper, silver or gold layer when the cell is being charged. If the REDOX cell is discharged, the current flows between the electrodes causing the lead to deplate from the negative electrode and the metal coating on the electrode will act as a catalyst to cause increased current density.



## ADVANCED INORGANIC SEPARATORS FOR ALKALINE BATTERIES AND METHOD OF MAKING

NASA Case No. LEW-13,171-1  
Inventor: Dean W. Sheibley  
Australia, Canada, Ireland,  
Japan, Belgium, France,  
West Germany, Great Britain,  
Italy, The Netherlands, Sweden,  
Switzerland

*Address inquiries to:*  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

*Corresponding to U.S. Patent No. 4,331,746*

*Filed 2-27-81  
Issued 5-25-82*

A flexible, porous battery separator comprising a coating applied to a porous, flexible substrate. The coating comprises:

- (a) a thermoplastic rubber-based resin which is insoluble and unreactive in the alkaline electrolyte.
- (b) a polar organic plasticizer which is reactive with the alkaline electrolyte to produce a reaction product which contains a hydroxyl group and/or carboxylic acid group, and
- (c) a mixture of polar particulate filler materials which are unreactive with the electrolyte, the mixture comprising at least one first filler material having a surface area of greater than 25 meters<sup>2</sup>/gram, at least one second filler material having a surface area of 10 to 25 meters<sup>2</sup>/gram, wherein the volume of the mixture of filler materials is less than 45% of the total volume of the fillers and the binder, the filler surface area per gram of binder is about 20 to 60 meters<sup>2</sup>/gram, and the amount of plasticizer is sufficient to coat each filler particle.

A method of forming the battery separator.

**PROCESS FOR IMPROVING MOISTURE RESISTANCE OF EPOXY  
RESINS BY ADDITION OF CHROMIUM IONS**

**NASA Case No. LAR-13,226-1  
Inventor: Anne St. Clair, et al.  
Belgium, Canada, France,  
West Germany, Great Britain,  
Japan, The Netherlands,  
Sweden, Switzerland**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent No. 4,510,277*

*Filed 11-3-83  
Issued 4-9-85*

A product and the process for preparing the same to improve the moisture resistance properties of epoxidized TGMDA and DGEBA resin systems by chemically incorporating chromium (III) ions therein without impairing the mechanical strength properties of the resins.

**PROCESS FOR IMPROVING MECHANICAL PROPERTIES  
OF EPOXY RESINS BY ADDITION OF COBALT IONS**

**NASA Case No. LAR-13,230-1  
Inventor: Diane M. Stoakley, et al.  
Belgium, Canada, France,  
West Germany, Great Britain,  
Italy, Japan, The Netherlands,  
Sweden, Switzerland**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent No. 4,473,674*

*Filed 11-3-83  
Issued 9-25-84*

A resin product useful as an adhesive, composite or casting resin and the process for preparing same to improve the flexural strength mechanical property characteristics thereof. This improved flexural strength is attained with little or no change in density, thermal stability or moisture resistance by chemically incorporating 1.2 to 10.6% by weight CO(III) ions in an epoxidized resin system.

# FLUORESCENCE DETECTOR FOR MONITORING ATMOSPHERIC POLLUTANTS

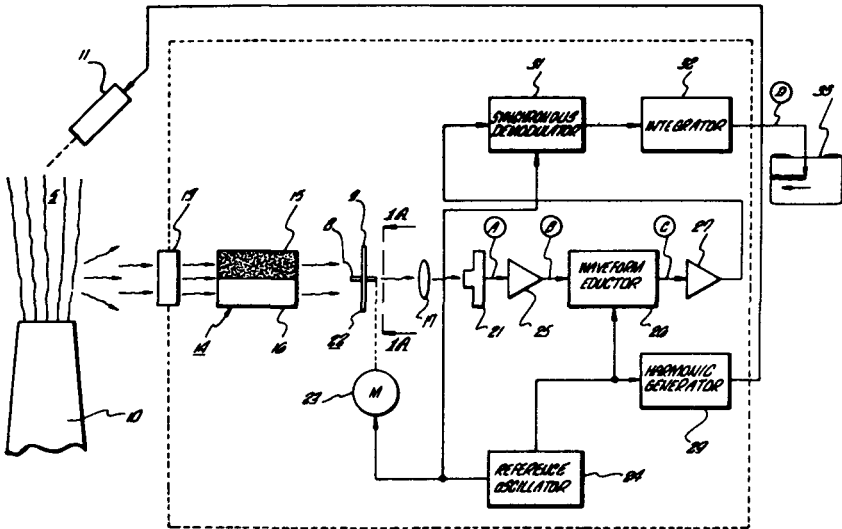
**NASA Case No. NPO-13231**  
**Inventor: Robert T. Menzies**  
**Canada**

*Address inquiries to:*  
 NASA Resident Legal Office  
 Attn: Patent Counsel  
 Mail Code: 180-601  
 4800 Oak Grove Drive  
 Pasadena, CA 91103  
 U.S.A.

*Corresponding to U.S. Patent No. 3,891,848*

*Filed 12-27-73*  
*Issued 6-24-75*

It has become essential that the gasses in smokestack plumes and the like be monitored for the presence of pollutants such as NO, NO<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, and O<sub>3</sub>. In this invention, a laser source excites the atmospheric area of the pollutants until the beam causes the pollutants to fluoresce and emit a return signal to a detector. Analysis of this signal as compared to a known standard yields a signal indicative of the magnitude of the pollutant being analyzed.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.



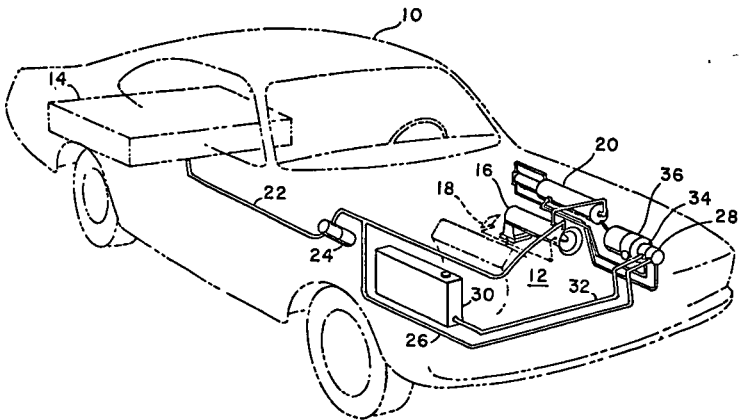
## HYDROGEN RICH GAS GENERATOR

NASA Case No. NPO-13342  
Inventor: John Houseman, et al.  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

*No Patent in U.S.*

This invention is a generator for generating a hydrogen rich gas to be mixed with a hydrocarbon fuel for use in an internal combustion engine. Such a mixture considerably lowers the pollutants emitted by an internal combustion engine. The hydrogen rich gas is generated in a cylindrically shaped chamber by injecting air and hydrocarbon fuel at one end of said chamber, igniting the mixture of said air and hydrocarbon fuel to provide very hot combustion gases, by partial oxidation of the hydrocarbon. These gases move away from said ignition region to another region where water is injected to be turned into steam by the hot combustion gases. Either simultaneously with the injection of water or subsequently thereto, more hydrocarbon fuel is injected. The steam which is formed mixes with the hot gases present to yield a uniform hot gas whereby a steam reforming reaction with the hydrocarbon fuel takes place to produce a hydrogen rich gas.



# A MULTITARGET SEQUENTIAL SPUTTERING APPARATUS

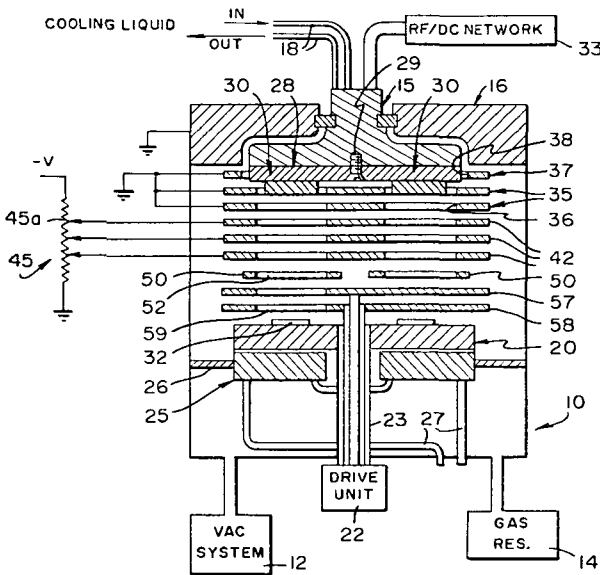
**NASA Case No. NPO-13345-1**  
**Inventor: Rindge Shima**  
**Canada, Japan**

*Address inquiries to:*  
 NASA Resident Legal Office  
 Attn: Patent Counsel  
 Mail Code: 180-601  
 4800 Oak Grove Drive  
 Pasadena, CA 91103  
 U.S.A.

*Corresponding to U.S. Patent No. 3,864,239*

*Filed 4-22-74*  
*Issued 2-4-75*

Sputter deposition is a process for depositing atoms on a substrate to be used in an electronic device. With this invention it is possible to produce a multilayer structure of different materials in which each layer is of very precise thickness and the interface between layers is absolutely free of contamination. This apparatus includes a stationary cathode, a rotatable anode, different target materials on the cathode, elements bearing apertures to expose the targets, and power means to control the electrical potentials of the system.



**PROCESS FOR PREPARING HIGHLY OPTICALLY  
TRANSPARENT/COLORLESS AROMATIC POLYIMIDE FILM**

**NASA Case No. LAR-13,351-1**  
**Inventor: Ann K. St. Clair, et al.**  
**Canada**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent Application No. 643,589      Filed 8-23-84*

An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the like, and the processes for preparing same by thermal and chemical conversion are disclosed. An essential feature of the invention for achieving maximum optical transparency films requires utilizing recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and introducing phenoxy or thiophenyl separator groups and isomeric m,m'- or o,p'-oriented diamines into the polymer molecular structure. The incorporation of these groups in the polymer structure serves to separate the chromaphoric centers and reduce the formation of inter-chain and intra-chain charge transfer complexes which normally cause absorptions in the UV-visible range. The films may be obtained by hand, brushing, casting or spraying a layer of the polyamic acid solutions onto a surface and thermally converting the applied layer to the polyimide or the polyamic acid solution can be chemically converted to the polyimide, subsequently dissolved in an organic solvent, and applied as a polyimide film layer with the solvent therein thermally removed.

**PROCESS FOR PREPARING ESSENTIALLY COLORLESS  
POLYIMIDE FILM CONTAINING PHENOXY-LINKED DIAMINES**

**NASA Case No. LAR-13,353-1  
Inventor: Ann K. St. Clair, et al.  
Canada**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent Application No. 643,524      Filed 8-23-84*

An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the like and the process for preparing same are disclosed. An essential feature of the invention for achieving maximum optical transparency films requires utilizing recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and introducing bulky electron-withdrawing groups and separator groups into the polymer molecular structure. The incorporation of bulky electron-withdrawing groups in the diamine portion of the polymer structure serves to reduce the formation of inter-chain and intra-chain charge transfer complexes which normally cause large absorptions in the UV-visible range. Incorporation of separator atoms into either the diamine or dianhydride monomers serves to reduce the amount of conjugation and inter- and intra-chain electronic interactions and thereby lessen charge transfer complex formation.

**COPOLYIMIDES WITH A COMBINATION OF  
FLEXIBILIZING GROUPS**

**NASA Case No. LAR-13,354-1**  
**Inventor: Terry L. St. Clair, et al.**  
**Australia, Belgium, Canada,**  
**France, West Germany, Great**  
**Britain, Italy, Japan,**  
**The Netherlands, Sweden,**  
**Switzerland**

*Address inquiries to:*  
Langley Research Center  
Attn: Patent Counsel  
Mail Code: 279  
Langley Station  
Hampton, VA 23665  
U.S.A.

*Corresponding to U.S. Patent Application No. 746,901      Filed 6-20-85*

According to the present invention, incorporation of the proper mix of flexibilizing units into the backbone of a linear aromatic polyimide is achieved. The flexible units independently have been shown by others to enhance thermoplastic character in polyimides, however in the present invention the proper incorporation of the prepreg combinations of these units leads to unexpected synergistic improvements in softening, thermoplastic or flow behavior in the resulting polymers.

## SMALL, POROUS, POLYACRYLATE BEADS

**NASA Case No. NPO-13383**  
**Inventor: Alan Rembaum, et al.**  
**Canada, Japan**

*Address inquiries to:*  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

*Corresponding to U.S. Patent No. 4,046,720*

*Filed 1-17-74*  
*Issued 9-6-77*

The invention is a method for making uniformly-shaped, porous, round beads. The beads may be used as adsorbents in chromatography and as markers for studies of cell surface receptors. The beads are prepared by the co-polymerization of an acrylic monomer and a cross-linking agent in the presence of 0.05 to 5% by weight of an aqueous soluble polymer such as polyethylene oxide. Cross-linking proceeds at high temperature above about 50°C or at a lower temperature with irradiation. Beads of even shape and even size distribution of less than 2 micron diameter are formed. The beads will find use as adsorbents in chromatography and as markers for studies of cell surface receptors.

# COOPERATIVE MULTIAXIS SENSOR FOR TELEOPERATION OF ARTICLE MANIPULATING APPARATUS

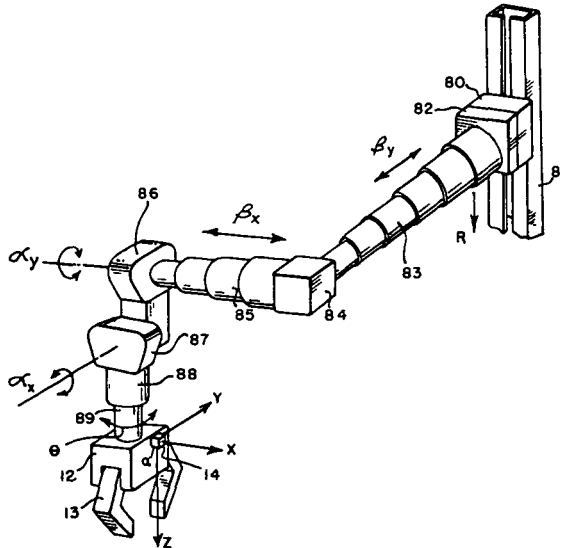
NASA Case No. NPO-13386-1  
Inventor: Alan R. Johnston  
Canada, Japan

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,888,362

Filed 5-31-74  
Issued 6-10-75

There are numerous tasks involving the manipulation of an article from a remote location under the control of an operator who can place the grasping element in the proximity of the article, but cannot make the final positioning and orientation of the grasping element to successfully grasp the element. The present invention relates to a device which can make the final positioning and orientation to grasp the element. The invention incorporates a corner retroreflector, plane mirrors, photodetectors and a pulsed light source to derive signals to achieve the final steps of grasping the element.



# SYSTEM FOR MINIMIZING INTERNAL COMBUSTION ENGINE POLLUTION EMISSION

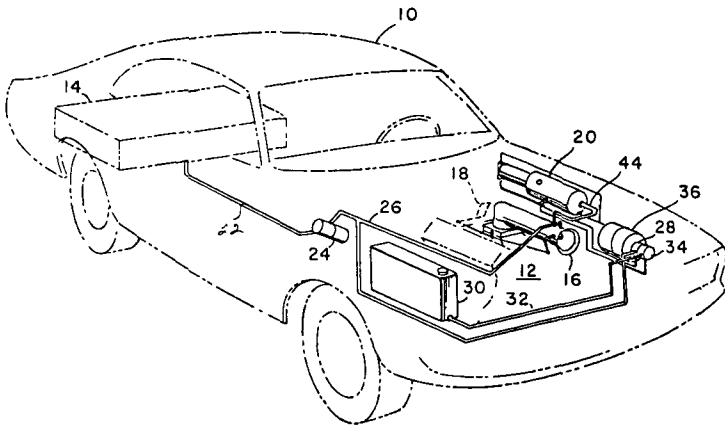
NASA Case No. NPO-13402  
Inventor: Jack H. Rupe  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,906,913

Filed 8-10-73  
Issued 9-23-75

It is well known that the emitted pollutants of an internal combustion engine are considerably reduced as the fuel-to-air ratio is reduced. However, as the fuel-to-air ratio is reduced, a point is soon reached where the mixture is no longer flammable. It has been found, though, that an ultra lean mixture can be made flammable if mixed with a hydrogen rich gas. This invention is a mixing device which simultaneously atomizes liquid fuel, mixes this fuel with an optimal quantity of hydrogen and combines this mixture with a prescribed quantity of air. A throttling mechanism controls the fuel delivery to the engine and also limits the fuel to air equivalence ratio to a predetermined upper boundary to inhibit the production of air pollutants and to a lower boundary which is above the lean flammability of the mixture.





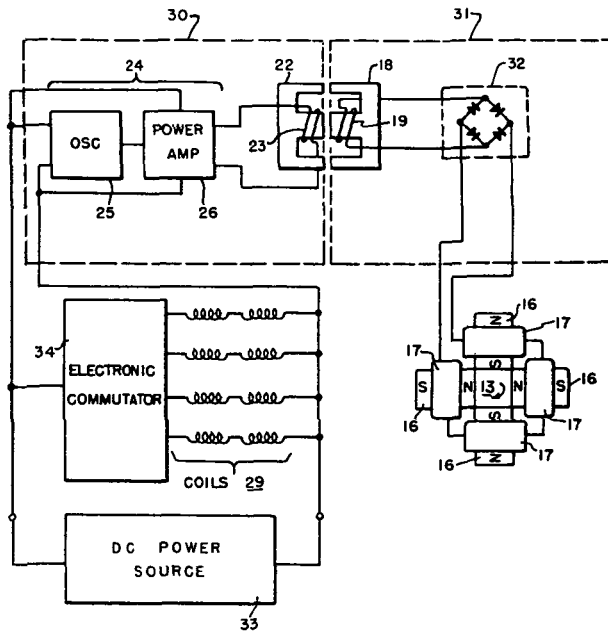
# BRUSHLESS DC MOTOR WITH WOUND ROTOR

NASA Case No. NPO-13437-1  
Inventor: Edward J. Bahm  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

*No Corresponding U.S. Patent*

Brushless dc motors are gradually becoming competitive with the conventional dc motor. In this invention the rotor is an electromagnet energized through a transformer having its primary winding stationary on the stator, and its secondary winding mounted on the rotor. Controlled dc current applied to the motor is converted to ac current for inductive coupling to the rotating secondary winding. The ac current in the secondary winding is rectified to provide dc current to the rotor field coil.



# IMPROVED HYDROGEN-RICH GAS GENERATOR

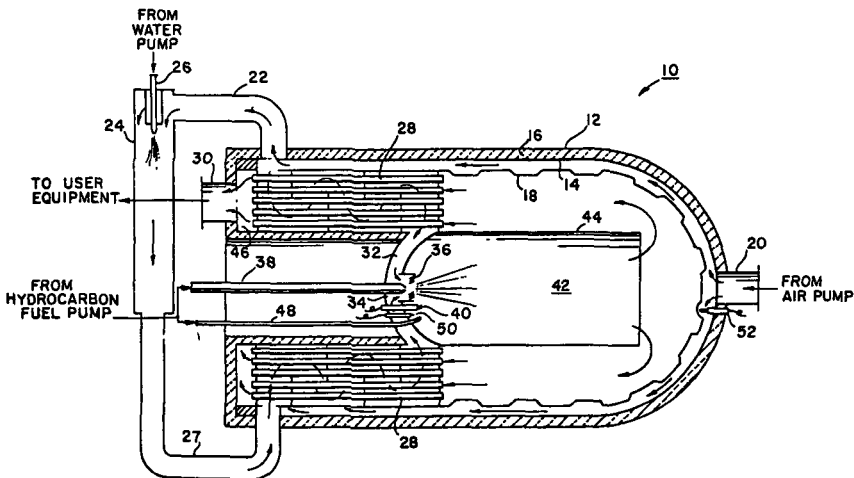
NASA Case No. NPO-13464-1  
Inventor: John Houseman  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,920,416

Filed 12-26-73  
Issued 11-18-75

While the invention of NASA Case No. NPO-13342 does provide hydrogen rich gases, it also has a tendency to form carbon. Since one of the purposes of the hydrogen generator is to provide hydrogen gas to be used in an internal combustion engine, the presence of the carbon which is generated is undesirable since it tends to clog up the induction system of the internal combustion engine. This invention minimizes the carbon output of a hydrogen rich generator by preheating the input air, then injecting atomized water into the preheated air stream and after some more preheating, the resulting steam-air mixture is introduced into the flame zone. An alternate method is to atomize the water and introduce it directly into the flame zone.



# HIGH VOLTAGE, HIGH CURRENT SCHOTTKY BARRIER SOLAR CELL

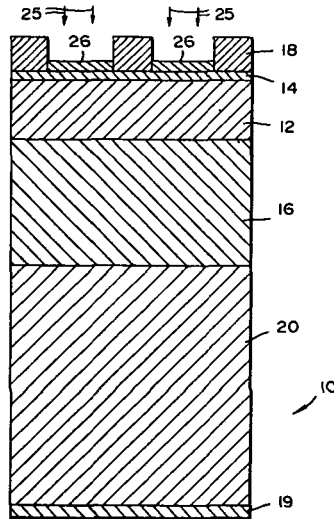
NASA Case No. NPO-13482-1  
Inventor: Richard J. Stirn  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 4,053,918

Filed 8-5-74  
Issued 10-11-77

Extensive research is being conducted to find more efficient solar cells. One such effort is the use of GaAs and this invention is a Schottky barrier solar cell consisting of a layer of wide band gap semiconductor material such as AlGaAs on which a very thin film of semi-transparent metal is deposited to form a Schottky barrier. The layer of the wide band gap semiconductor material is on top of a layer of narrow band gap semiconductor material. The first layer is very efficient for converting the energy of high energy photons and the second layer is efficient in converting the energy of the lower energy photons.



## REFLECTED-WAVE MASER

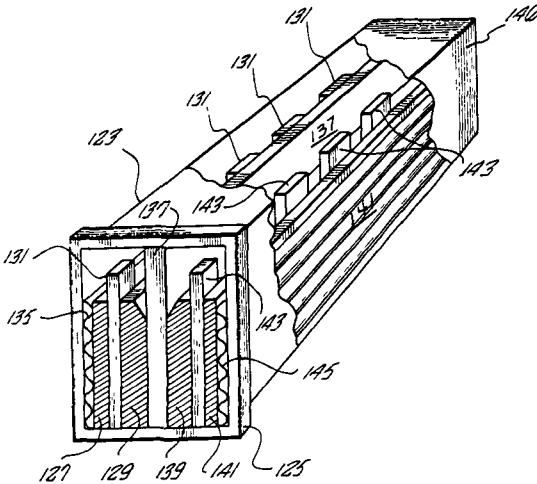
NASA Case No. NPO-13490  
Inventor: Robert C. Clauss  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,978,417

Filed 2-12-75  
Issued 8-31-76

A number of traveling-wave, slow-wave maser structures, containing active maser material but absent the typical ferrite isolators, are immersed in a nonuniform magnetic field. The microwave signal to be amplified is inserted at a circulator which directs the signal to a slow-wave structure. The signal travels through the slow-wave structure, being amplified according to the distance traveled. The end of the slow-wave structure farthest from the circulator is arranged to be a point of maximum reflection of the signal traveling through the slow-wave structure.



# THERMOSTATICALLY CONTROLLED NON-TRACKING TYPE SOLAR ENERGY CONCENTRATOR

**NASA Case No. NPO-13497**  
**Inventor: Katsunori Shimada**  
**Canada**

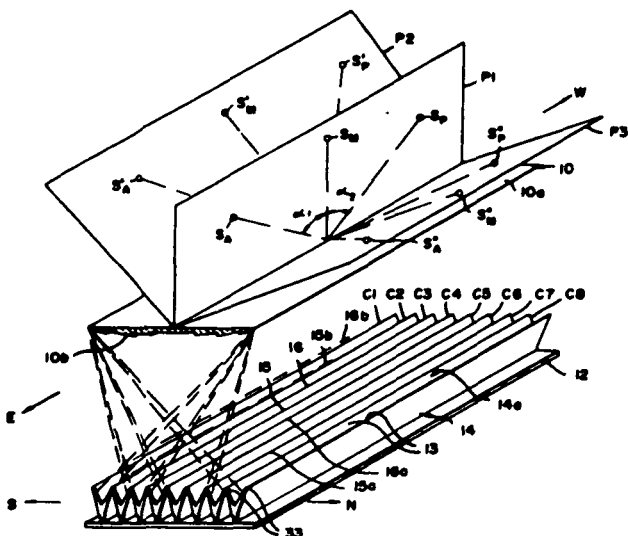
**West Germany**

*Address inquiries to:*  
**NASA Resident Legal Office**  
**Attn: Patent Counsel**  
**Mail Code: 180-601**  
**4800 Oak Grove Drive**  
**Pasadena, CA 91103**  
**U.S.A.**

*Corresponding to U.S. Patent No. 3,915,148*

*Filed 11-22-74*  
*Issued 10-28-75*

A solar energy concentrator comprises an array of cylindrical Fresnel lenses, all of which are fixedly aligned in the East-West direction. Each lens concentrates the sun rays and forms a line image which extends in the East-West direction. Located below the lenses are individual fluid channels which extend in the East-West direction and are spaced apart in the South-North direction. Each line image focuses onto preferably not more than two of the channels which absorb heat of the concentrated sun rays. Each channel has a thermostatically controlled valve which controls fluid flow through the channel to take place only when the channel's temperature and/or the fluid therein exceed a threshold temperature level.



## ANTI-FOG COMPOSITION

NASA Case No. MSC-13530-2

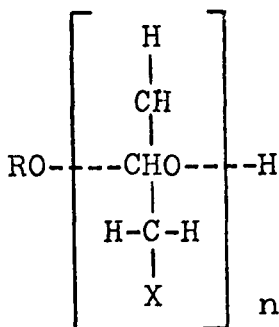
Inventor: Dorrie L. Carmin, Jr., et al.  
Canada, France, Great Britain,  
\*Japan, The Netherlands, West  
Germany

Address inquiries to:  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AM  
Houston, TX 77058  
U.S.A.

Corresponding to U.S. Patent No. 3,856,534

Filed 9-8-72  
Issued 12-24-74

The development and chemical composition of a substance to prevent fogging of windows, mirrors, glasses, space suit visors, and similar optical equipment are discussed. The materials consists of an alkyl glycerol sulfonate, water, and a time extender in the form of an oil. The materials is expected to prevent fogging of visual surfaces for periods of five hours or more during maximum metabolic loads.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**MODIFICATION OF THE PHYSICAL PROPERTIES  
OF FREEZE-DRIED RICE**

**NASA Case No. MSC-13540-1**  
**Inventor: Clayton S. Huber**  
**Canada**

*Address inquiries to:*  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AM  
Houston, TX 77058  
U.S.A.

*Corresponding to U.S. Patent No. 3,692,533*

*Filed 8-28-70*  
*Issued 9-19-72*

The method steps include first cooking rice over a low simmering heat until it is tender and edible. Then it is frozen and thawed for two complete cycles. Thereafter, the rice is again frozen and freeze dried in a vacuum sufficient to remove water from the rice by sublimation. Rehydration is accomplished by placing the rice in water at an elevated temperature and normally requires only a minute or so. The cycle of first freezing and then thawing appears to change grain porosity and permits easy and rapid sublimation of the water vapor.

## HYDROGEN-RICH GAS GENERATOR

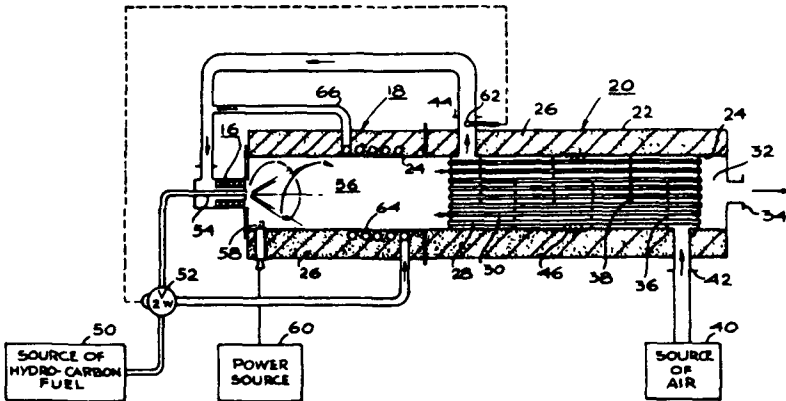
NASA Case No. NPO-13560-1  
Inventor: John Houseman, et al.  
Canada

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 3,982,910

Filed 7-10-74  
Issued 9-28-76

The inventions of NASA Case Nos. NPO-13342, NPO-13402 and NPO-13464 all require pure water and a consequent water tank. The inherent problems of maintaining a water tank in an automobile, such as finding sources of pure water and preventing freezing of the water, can be obviated with this invention which is a means for generating a soot-free hydrogen-rich gas from liquid hydrocarbon fuel. In this invention, the hydrocarbon fuel is vaporized and is then mixed with preheated air. Thereafter, the mixture is ignited and partial oxidation is permitted. Finally, the products of the combustion chamber in the hydrogen reactor are passed through a nickel catalyst bed where flameless partial oxidation of the fuel takes place on the surface of the catalyst to produce a hydrogen-rich gas.





## HIGH TEMPERATURE RESISTANT CERMET AND CERAMIC COMPOSITIONS

NASA Case No. NPO-13690  
 Inventor: Wayne M. Phillips  
 \* Japan

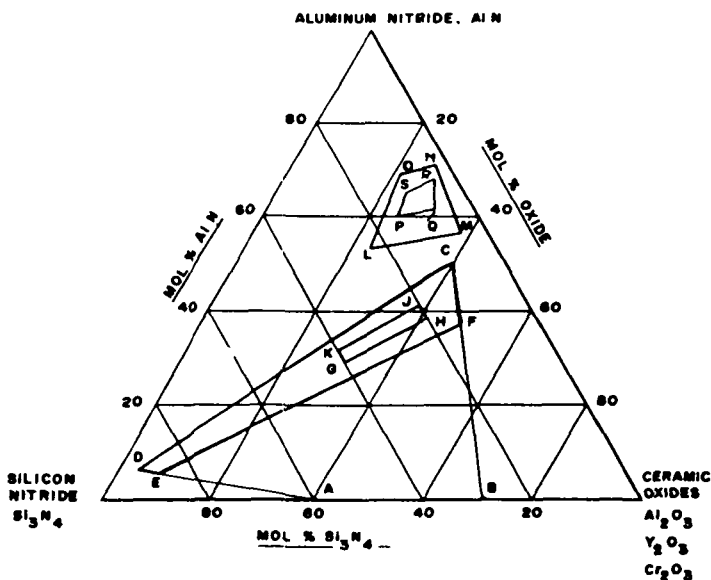
Address inquiries to:  
 NASA Resident Legal Office  
 Attn: Patent Counsel  
 Mail Code: 180-601  
 4800 Oak Grove Drive  
 Pasadena, CA 91103  
 U.S.A.

Corresponding to U.S. Patent No. 4,072,532

Filed 11-20-75  
 Issued 2-7-78

Cermet compositions having high temperature oxidation resistance, high hardness and high abrasion and wear resistance, and particularly adapted for production of high temperature resistant cermet insulator bodies, comprising a sintered body of particles of a high temperature resistant metal or metal alloy, preferably molybdenum or tungsten particles, dispersed in and bonded to a solid solution formed of aluminum oxide and silicon nitride, and particularly a ternary solid solution formed of a mixture of aluminum oxide, silicon nitride and aluminum nitride. Also disclosed are novel ceramic compositions comprising a sintered solid solution of aluminum oxide, silicon nitride and aluminum nitride.

The cermet compositions are designed particularly to provide high temperature resistant refractory coatings on metal substrates, preferably molybdenum or tungsten substrates.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

# ACOUSTIC ENERGY SHAPING OF SUSPENDED MELTABLE MATERIALS WHILE IN THE PLASTER SHAPE

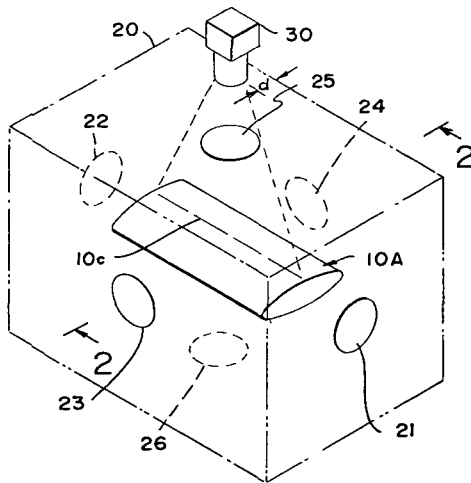
NASA Case No. NPO-13802  
Inventor: Taylor G. Wang, et al.  
Canada, Japan

Address inquiries to:  
NASA Resident Legal Office  
Attn: Patent Counsel  
Mail Code: 180-601  
4800 Oak Grove Drive  
Pasadena, CA 91103  
U.S.A.

Corresponding to U.S. Patent No. 4,052,181

Filed 2-13-76  
Issued 10-4-77

A suspended mass is shaped by melting all or a selected portion of the mass and applying acoustic energy in varying amounts to different portions of the mass. In one technique for forming an optical waveguide slug, a mass of oval section is suspended and only a portion along the middle of the cross-section is heated to a largely fluid consistency. Acoustic energy is applied to opposite edges of the oval mass to press the unheated opposite edge portions together so as to form bulges at the middle of the mass. In another technique for forming a ribbon of silicon for constructing solar cells, a cylindrical thread of silicon is drawn from a molten mass of silicon, and acoustic energy is applied to opposite sides of the molten thread to flatten it into a ribbon.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

## ARC SPRAY FABRICATION OF METAL MATRIX COMPOSITE MONOTAPE

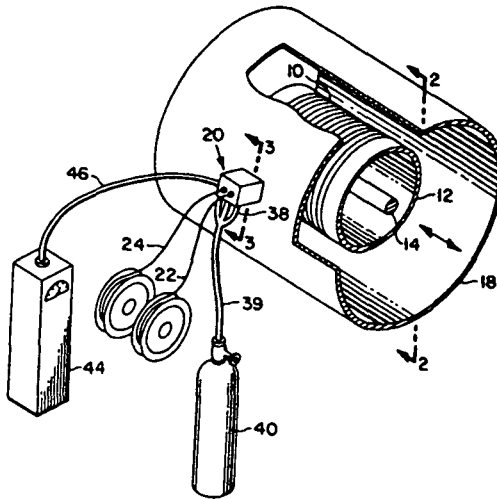
NASA Case No. LEW-13,828-1  
Inventor: Leonard J. Westfall  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, India, Israel,  
Japan, The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,518,625

Filed 12-9-83  
Issued 5-21-85

Arc metal spraying is used to spray liquid metal onto an array of high strength fibers that have been previously wound onto large drum contained inside a controlled atmosphere chamber. This chamber is first evacuated to remove any contaminants and then backfilled with a neutral gas up to atmospheric pressure.



# A LINEARIZED TRAVELING WAVE AMPLIFIER WITH HARD LIMITER CHARACTERISTICS

NASA Case No. LEW-13,981-1

Inventor: Henry G. Kosmahl  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, India, Israel,  
Japan, The Netherlands, Sweden,  
Switzerland

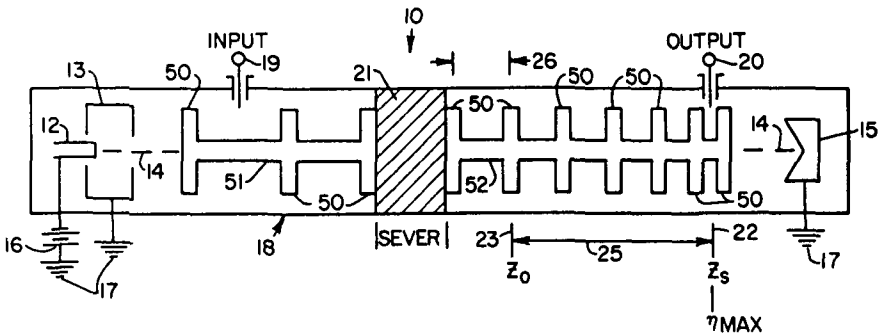
Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,564,898

Filed 5-9-83  
Issued 1-14-86

The object of the invention is to provide a traveling wave tube with increased linearity to avoid intermodulation of signals being amplified.

In a traveling wave tube, the slow wave structure is a helix including a sever. A dynamic velocity taper is provided by gradually reducing the spacing between the repeating elements of the slow wave structure which are the windings of helix. The reduction takes place between  $Z_0$  and  $Z_s$ , indicated by a line, which coincides with the output point of helix as indicated by the line. The spacing begins to decrease at  $Z_0$  and is decreased by up to about 15% efficiency at  $Z_s$ .



# VORTEX GENERATING FLOW PASSAGE DESIGN FOR INCREASED FILM COOLING EFFECTIVENESS

NASA Case No. LEW-14,039-1

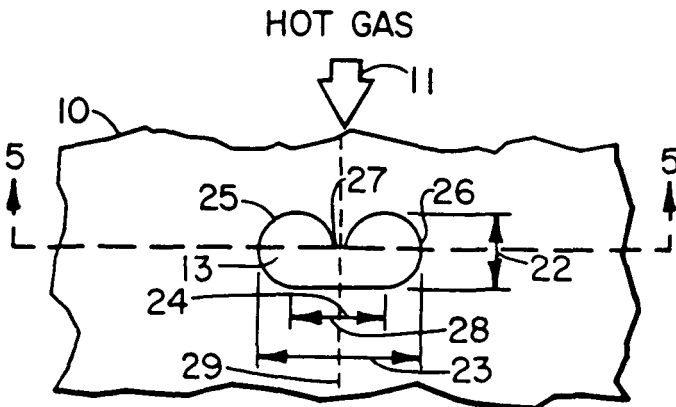
Inventor: S. Stephen Papell  
Belgium, Canada, France,  
West Germany, Great Britain,  
Israel, Italy, Japan,  
The Netherlands, Spain, Sweden,  
Switzerland

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent No. 4,529,358

Filed 2-15-84  
Issued 7-16-85

It is an object of the invention to provide a film cooling apparatus of increased effectiveness and efficiency. In accordance with the invention, a cooling fluid is injected into a hot flowing gas through a passageway in a wall which contains and is subject to the hot gas. The passageway is slanted in a downstream direction at an acute angle to the wall. A cusp shape is provided in the passageway to generate vortices in the injected cooling fluid thereby reducing the energy extracted from the hot gas for that purpose. The cusp shape increases both film cooling effectiveness and wall area coverage. The cusp may be at either the downstream or upstream side of the passageway, the former substantially eliminating flow separation of the cooling fluid from the wall immediately downstream of the passageway.



# VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS

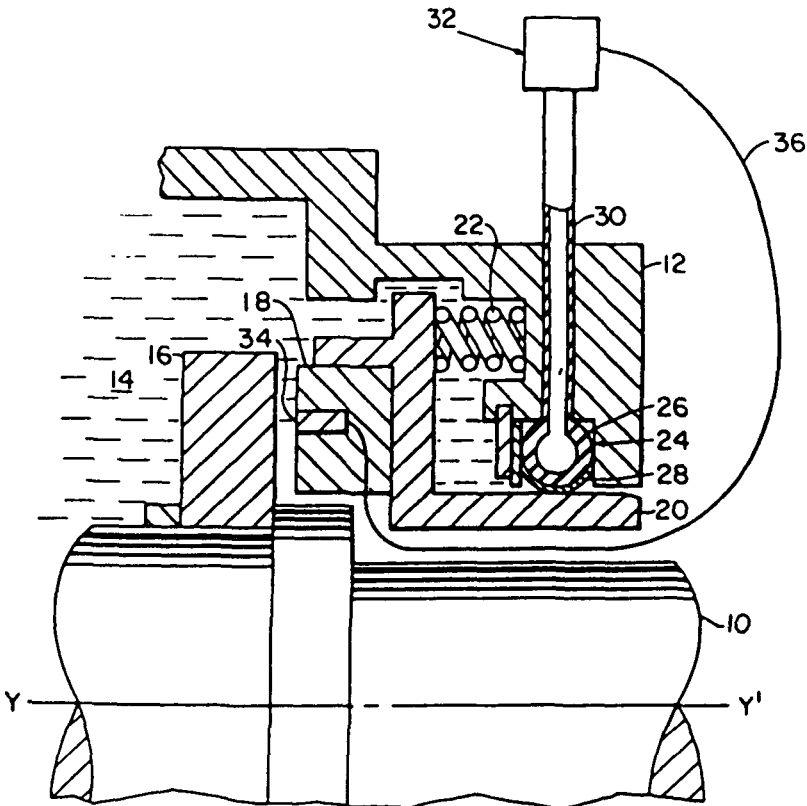
NASA Case No. LEW-14,170-1  
Inventor: Eliseo DiRusso  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, Ireland,  
Israel, Japan, The Netherlands,  
Sweden, Switzerland, Taiwan

Address inquiries to:  
Lewis Research Center  
Attn: Patent Counsel  
Mail Code: 60-2  
21000 Brookpark Road  
Cleveland, OH 44135  
U.S.A.

Corresponding to U.S. Patent Application No. 672,224 Filed 11-16-84

Vibration and stability of a primary seal ring is controlled by a secondary seal system. An inflatable bladder which forms a portion of secondary seal varies the damping applied to this seal ring.

The amplitude of vibration of the primary seal ring is sensed with a proximity probe that is connected to a microprocessor in a control system. The bladder pressure is changed by the control system to mitigate any sensed instability or vibration.



**METHOD OF FLUXLESS BRAZING AND DIFFUSION  
BONDING OF ALUMINUM CONTAINING COMPONENTS**

**NASA Case No. MSC-14435-1**  
**Inventor: Aleck B. Featherston, et al.**  
**Canada, Japan**

*Address inquiries to:*  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AM  
Houston, TX 77058  
U.S.A.

*Corresponding to U.S. Patent No. 3,937,387*

*Filed 3-12-74*  
*Issued 2-10-76*

Aluminum and its alloys are extremely attractive for fabrication into certain components. Among these is the fabrication of radiator panels for use in orbiting satellites. This invention discloses a new welding technique for aluminum alloys namely diffusion bonding or brazing. The salient step of the invention is the use of a polymeric sealer which is applied to clean the surface and which leaves no residue when thermally removed.

# METHOD FOR SHAPING AND AIMING NARROW BEAMS

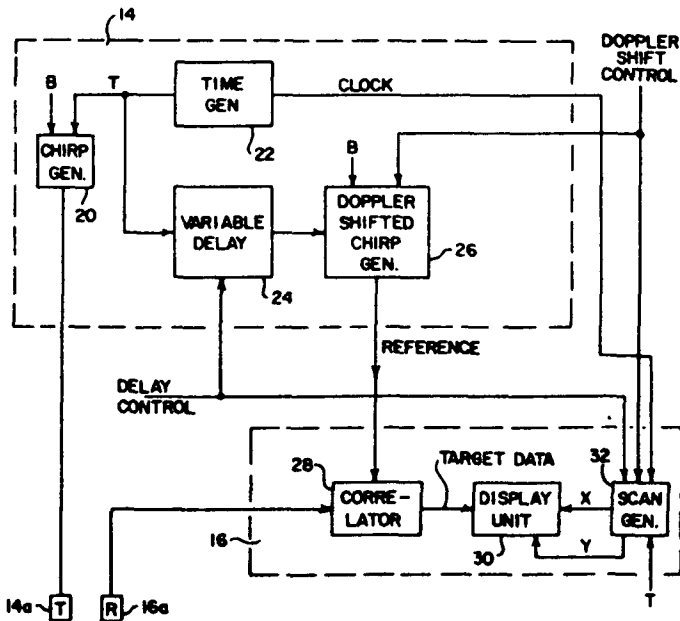
NASA Case No. NPO-14632-1  
**Inventor: Richard C. Heyser**  
 Canada, Japan, Norway, Australia,  
 France, West Germany, Italy,  
 Sweden, Switzerland, Great Britain,  
 Belgium, The Netherlands

Address inquiries to:  
 NASA Resident Legal Office  
 Attn: Patent Counsel  
 Mail Code: 180 801  
 4800 Oak Grove Drive  
 Pasadena, CA 91109  
 U.S.A.

Corresponding to U.S. Patent No. 4,287,578

Filed 11-7-79  
 Issued 9-1-81

A method and apparatus for use as a linear frequency chirp in a transmitter/receiver having a correlator to synthesize a narrow beamwidth pattern from otherwise broadbeam transducers when there is relative velocity between the transmitter/receiver and the target. The chirp is produced in a generator in bandwidth,  $B$ , and time,  $T$ , to produce a time-bandwidth product,  $TB$ , that is increased for a narrower angle. A replica of the chirp is time delayed and Doppler shifted for use as a reference for correlation of received chirps from targets. This reference is Doppler shifted to select targets preferentially to not only synthesize a narrow beam but also aim the beam in azimuth and elevation.





## STABILIZED UNSATURATED POLYESTERS

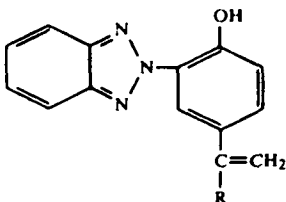
NASA Case No. NPO-16,103-1  
Inventor: Otto Vogl, et al.  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, Japan,  
The Netherlands, Sweden,  
Switzerland, South Africa

Address inquiries to:  
NASA Resident Legal  
Office-JPL  
Attn: Patent Counsel  
Mail Code: 180-801  
4800 Oak Grove Drive  
Pasadena, CA 91109  
U.S.A.

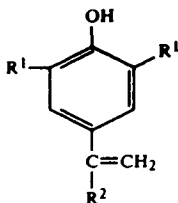
Corresponding to U.S. Patent No. 4,523,008

Filed 6-6-84  
Issued 6-11-85

An unsaturated polyester, such as propylene glycolmaleic acid-phthalic acid prepolymer dissolved in styrene interpolymerized with an ultraviolet absorber of the formula:



and/or an antioxidant of the formula:



where R and R<sup>2</sup> are selected from H or lower alkyl such as methyl and R<sup>1</sup> is tertiary alkyl such as tertiary butyl to form a polymer stable to exposure to the outdoors without degradation by ultraviolet radiation, thermal and/or photooxidation.

**PRODUCTION OF BUTANOL BY FERMENTATION IN THE  
PRESENCE OF COCULTURES OF CLOSTRIDIUM**

**NASA Case No. NPO-16,203-1  
Inventor: Sheryl L. Bergstrom, et al.  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Israel, Italy, Japan,  
Norway, The Netherlands, Mexico,  
Sweden, Switzerland, South  
Africa**

*Address inquiries to:*  
NASA Resident Legal  
Office-JPL  
Attn: Patent Counsel  
Mail Code: 180-801  
4800 Oak Grove Drive  
Pasadena, CA 91109  
U.S.A.

*Corresponding to U.S. Patent No. 4,539,293*

*Filed 5-10-83  
Issued 9-3-85*

Sugars are converted to a mixture of solvents including butanol by a fermentation process employing a coculture of microorganisms of the Clostridium genus, one of said microorganisms favoring the production of butyric acid and the other of which converts the butyric acid so produced to butanol. The use of a coculture substantially increases the yield of butanol over that obtained using a culture employing only one microorganism.

# URINE COLLECTION APPARATUS

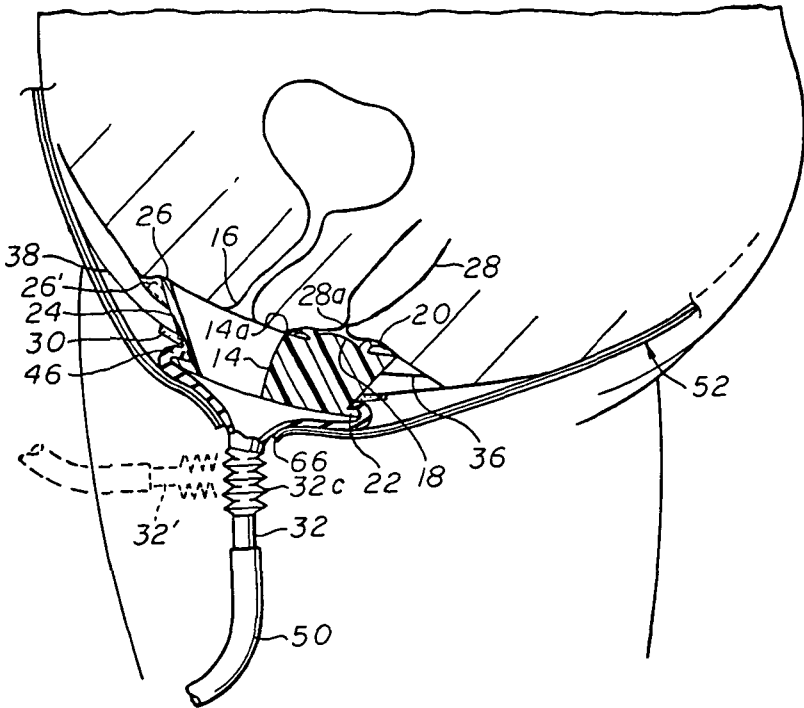
NASA Case No. MSC-18381-1  
Inventor: Roger B. Michaud  
Australia, Canada, Japan,  
Great Britain, West Germany,  
France, The Netherlands,  
Sweden, Switzerland

Address inquiries to:  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AL3  
Houston, TX 77058  
U.S.A.

Corresponding to U.S. Patent No. 4,270,539

Filed 4-27-79  
Issued 6-2-81

A urine collection device for females comprising an interface body having an interface surface for engagement with the user's body. The interface body comprises a forward portion defining a urine-receiving bore having an inlet in the interface surface adapted to be disposed in surrounding relation to the urethral opening of the user and a rear portion integrally adjoining the forward portion and having a non-invasive vaginal seal on the interface surface for sealing the vagina of the user from communication with the urine-receiving bore. An absorbent pad is removably supported on the interface body and extends laterally therefrom.



**HEAT SEALABLE, FLAME AND ABRASION  
RESISTANT COATED FABRIC**

**NASA Case No. MSC-18382-1  
Inventor: Richard P. Tschirch, et al.  
Canada, Japan, France,  
West Germany, Italy, Sweden,  
Switzerland, Belgium,  
Great Britain, The Netherlands**

*Address inquiries to:*  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AL3  
Houston, TX 77058  
U.S.A.

*Corresponding to U.S. Patent No. 4,284,682*

*Filed 4-30-80  
Issued 8-18-81*

Flame retardant, abrasion resistant elastomeric compositions comprised of thermoplastic polyurethane polymer and flame retarding amounts of a filler selected from decabromodiphenyloxide and antimony oxide in a 3:1 weight ratio, and decabromodiphenyloxide, antimony oxide, and ammonium polyphosphate in a 3:13 weight ratio respectively. Also, flame retardant, abrasion resistant, and heat sealable coated fabrics employing such elastomeric compositions as coating film.

# AUTOMATIC COMPRESSION ADJUSTING MECHANISM FOR INTERNAL COMBUSTION

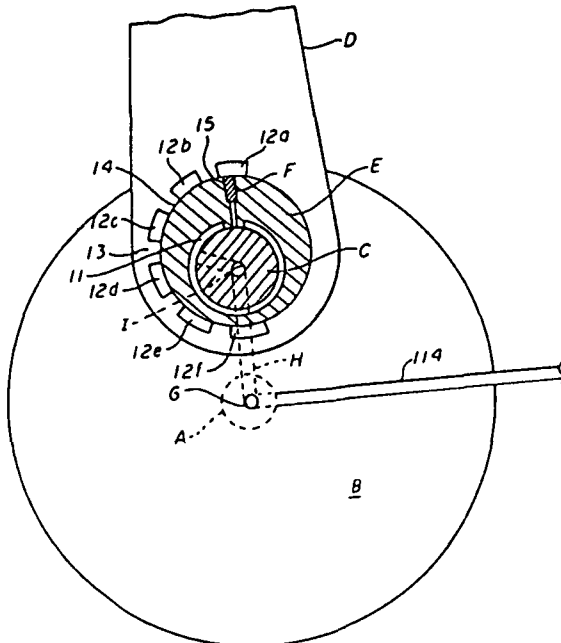
NASA Case No. MSC-18,807-1  
Inventor: James William Akkerman  
Canada, India, Japan, Spain,  
Belgium, France, West Germany,  
Great Britain, Italy,  
The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Johnson Space Center  
Attn: Patent Counsel  
Mail Code: AL3  
Houston, TX 77058  
U.S.A.

Corresponding to U.S. Patent No. 4,406,256

Filed 5-22-81  
Issued 9-27-83

Means for controlling the compression pressure in an internal combustion engine having one or more cylinders and subject to widely varying power output requirements. Received between each crank pin (C) and connecting rod (D) is an eccentric sleeve (F) selectively capable of rotation about the crank pin and/or inside the rod and for latching with the rod (D) to vary the effective length of the connecting rod and thereby the clearance volume of the engine. The eccentric normally rotates inside the connecting rod during the exhaust and intake strokes but a latching pawl (F) carried by the eccentric is movable radially outwardly to latch the rod and eccentric together. A control valve (J) responds to intake manifold pressure to time the supply of hydraulic fluid to move the latch-pawl outwardly, varying the rod length to maintain a substantially optimum firing chamber pressure at all intake manifold pressures.



# HERMETICALLY SEALABLE PACKAGE FOR HYBRID SOLID-STATE ELECTRONIC DEVICES AND THE LIKE

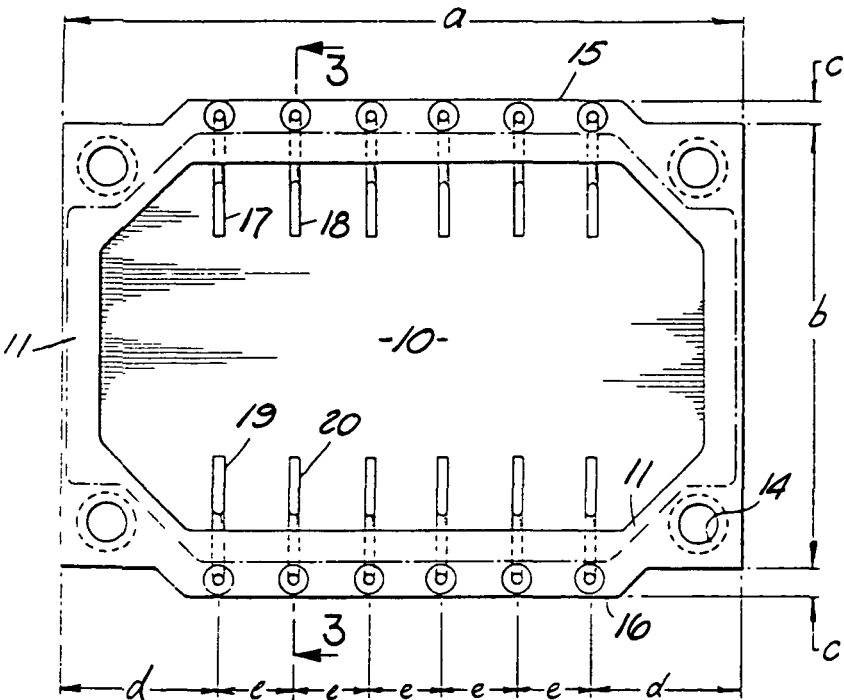
NASA Case No. MSC-20,181-1  
 Inventors: Wilson N. Miller, et al.  
 Canada, Japan, Norway, South Korea, Taiwan, Belgium, France, West Germany, Great Britain, Italy, The Netherlands, Sweden, Switzerland

Address inquiries to:  
 Johnson Space Center  
 Attn: Patent Counsel  
 Mail Code: AL3  
 Houston, TX 77058  
 U.S.A.

Corresponding to U.S. Application No. 392,093

Filed 6-25-82

A small component package employing a ring frame 11 of a mouldable polyamide-imide thermoplastic directly moulded onto a heat conducting base plate 10 with integral moulded anchoring pins of the thermoplastic material engaging corresponding bores 21 and 22 through the base plate. The other edge of the ring frame 11 is metalized as is the interface area 13 with a cover plate 12 of the same thermoplastic material for a soldered seal. Multiple solid electrical leads 17, 18, 19, 20 are moulded into the ring frame 11 during the base plate-to-ring from moulding operation to provide an inexpensive, sealed package which is also light in weight. Threaded inserts 14 facilitate a firm connection to an external heat sink surface along surface 10a of base plate 10.



## PROCESS AND APPARATUS FOR MAKING DIAMONDS

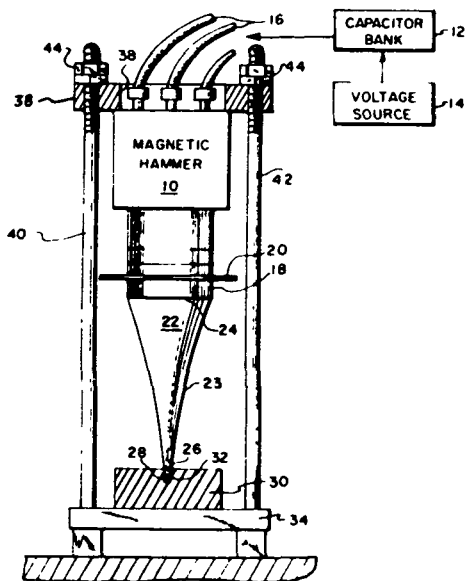
NASA Case No. MFS-20698  
Inventor: John R. Rasquin, et al.  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 3,632,242

Filed 1-16-70  
Issued 1-4-72

Diamonds of industrial grade may be fabricated from graphite by this simple but effective apparatus. An exponential horn is vertically positioned with its small end in a graphite receiving pocket. A magnetic hammer above the horn, generates a shock wave in the exponential horn and due to the horn geometry, the velocity of the shock wave is amplified and the shock wave energy concentrated so that all of the energy arrives simultaneously at the small end of the horn. This energy is transferred to the graphite in the anvil pocket and results in pressure and temperature levels that causes the graphite to be transformed, in part, to diamonds.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

# GRAPHITE-REINFORCED ALUMINUM COMPOSITE AND METHOD OF PREPARING THE SAME

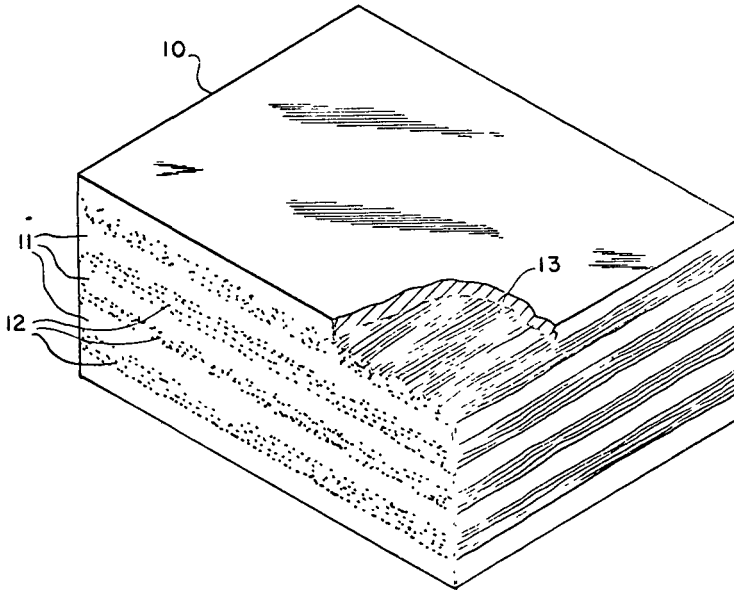
NASA Case No. MFS-21077  
Inventor: Felix P. Lalacoma  
Canada, \* Japan

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 3,894,677

Filed 3-24-71  
Issued 7-15-75

Graphite-reinforced aluminum composite material is prepared by coating high strength, high modulus, and low density graphite fiber with nickel, aligning the coated fibers between and in contact with aluminum sheets in a stacked array, and bonding the array into an integral body by application of heat and pressure. The resulting diffusion-bonded composite shows favorable mechanical properties, the graphite fibers remaining intact during the preparation process. Damaging reactions at the graphite surface are prevented by the protective nickel coating. The graphite-reinforced material prepared by the above method can be subjected to shaping or forming operations without breaking the fibers.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.



# METHOD AND APPARATUS FOR NON-DESTRUCTIVE TESTING

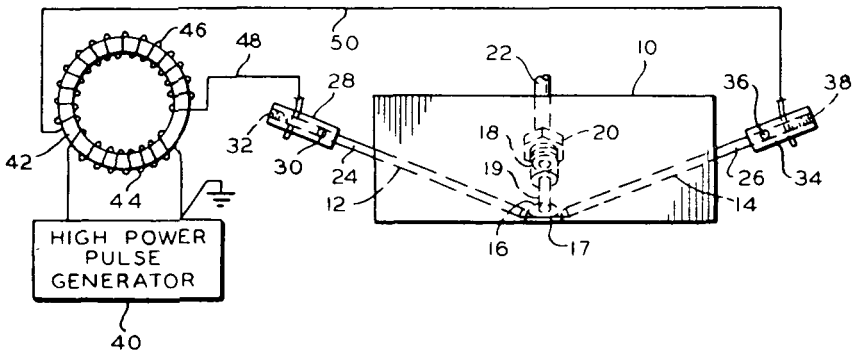
NASA Case No. MFS-21233  
Inventor: James M. Hoop  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 3,782,177

Filed 4-20-72  
Issued 1-1-74

A high voltage is applied to an arc gap adjacent to a test specimen to develop a succession of high-frequency arc discharges. Those high frequency arc discharges generate pulses of ultrasonic energy within the test specimen without requiring the arc discharges to contact that test specimen and without requiring a coupling medium between those arc discharges and that test specimen. Those pulses can be used for detection of flaws, for measurement of certain properties of the test specimen, and for measurement of stresses within that test specimen.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**MICROWAVE POWER TRANSMISSION SYSTEM  
WHEREIN LEVEL OF TRANSMITTED POWER IS  
CONTROLLED BY REFLECTIONS FROM RECEIVER**

NASA Case No. MFS-21470-1

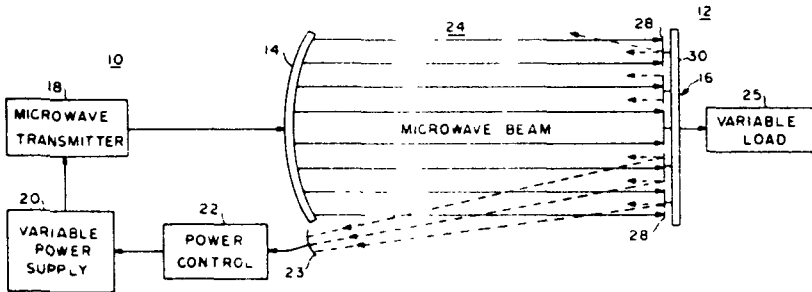
Inventor: William Jabez Robinson, Jr.  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 3,795,910

Filed 3-13-73  
Issued 3-5-74

This invention is a microwave, wireless, power transmission system in which the transmitted power level is adjusted to correspond with power required at a remote receiving station in which deviations in power load produce an antenna impedance mismatch causing variations in energy reflected by the power receiving antenna employed by the receiving station. The variations in reflected energy are sensed by a receiving antenna at the transmitting station and used to control the output power of a power transmitter.



**REFRACTORY PORCELAIN ENAMEL PASSIVE  
CONTROL COATING FOR HIGH TEMPERATURE ALLOYS**

**NASA Case No. MFS-22324**  
**Inventor: Byron Hamilton Auker, et al.**  
**Canada, \*Japan**

*Address inquiries to:*  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent No. 3,891,452*

*Filed 4-11-73*  
*Issued 6-24-75*

Many coating materials have been developed in the space program. This coating is an excellent thermal coating for exposed surfaces. These coatings have low solar absorptance and a high emittance to provide effective protection from solar radiation, reentry heating, dust, salt spray, etc. The coating of this invention meets these requirements and is easily cleanable and will maintain its physical integrity after severe thermal cycling. It is made up of a high-refractory-content boroaluminum silicate glass frit containing zirconium oxide, lithium fluoride, alkali metal and alkaline earth oxide-flux, zinc oxide and a submicron disperse phase of cubic-stabilized zirconium oxide.

\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

**POLYIMIDES OF ETHER-LINKED ARYL  
TETRACARBOXYLIC DIANHYDRIDES**

NASA Case No. MFS-22355-1  
Inventor: James Albert Webster  
Canada

*Address inquiries to:*  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent No. 3,925,312*

*Filed 7-11-74  
Issued 12-9-75*

This invention is used as fuel tank sealant. It is composed of a polyimide. This sealant exhibits excellent thermal, oxidative and hydrolytic stability; high tensile strength and elongation during extreme temperature exposures; improved fuel resistance; and lowered glass transition temperature.

**ETHER-LINKED ARYL TETRACARBOXYLIC  
DIANHYDRIDES**

**NASA Case No. MFS-22356  
Inventor: James Albert Webster  
Canada**

*Address inquiries to:*  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent No. 3,899,517*

*Filed 7-16-74  
Issued 8-12-75*

This invention is used as a fuel tank sealant. It is composed of tetracarboxylic acid and dianhydride. This sealant exhibits excellent thermal, oxidative, and hydrolytic stability; high tensile strength and elongation during extreme temperature exposures; improved fuel resistance; and lowered glass transition temperature.

# A PANEL FOR SELECTIVELY ABSORBING SOLAR THERMAL ENERGY AND THE METHOD OF PRODUCING SAID PANEL

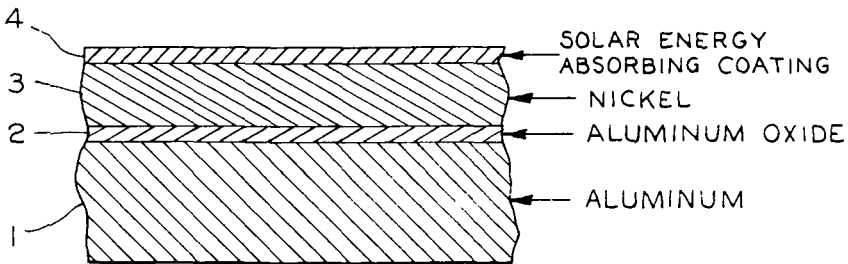
NASA Case No. MFS-22562  
Inventor: James Russell Lowery  
Canada, \*Japan

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 3,920,418

Filed 4-5-75  
Issued 11-18-75

Metal bodies having requisite absorptance to emittance ratios can be fabricated so that the heat absorbed is transferred to tubes carried in the metal body for subsequent use in heating and cooling operations. This invention is a panel for selectively absorbing solar thermal energy comprising a metallic substrate, and a solar thermal energy absorbing coating carried on the bright metallic material. A layer of zinc is interposed between the metal substrate and the layer of bright material or the metallic substrate can be anodized for receiving the layer of bright metallic material. Also disclosed is the method for producing the coating which selectively absorbs solar thermal energy.



\*Japanese manufacturing rights exclusively licensed to Japan Engineering Development Company. See page 23 for address. All other foreign patent rights available from NASA.

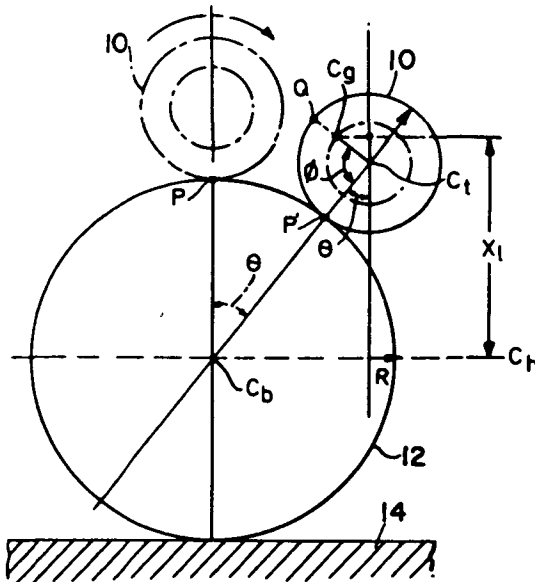
## ANTI-GRAVITY DEVICE

NASA Case No. MFS-22758-1  
Inventor: Sudarsha Pal Singh  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*No Corresponding U.S. Patent*

The invention consists of two spheres, one sphere having the capability of resting on top of the other sphere without falling off, even when either of the spheres is jiggled. The spheres are not fastened together in any way. The center of gravity of the top sphere is displaced from its geometrical center by a certain distance. The top sphere can rest on the bottom sphere with its center of gravity on the vertical line segment joining the geometrical centers of the spheres. Also, the top sphere can rest on the bottom sphere such that the line joining the centers of the two spheres is inclined to the vertical. In both positions, the top sphere can be rolled up and down on the surface of the bottom sphere to a predetermined maximum angle and, when released, will return to its original position atop the bottom sphere.



# A MOUNT FOR CONTINUOUSLY ORIENTING A COLLECTOR DISH IN A SYSTEM ADAPTED TO PERFORM BOTH DIURNAL AND SEASONAL SOLAR TRACKING

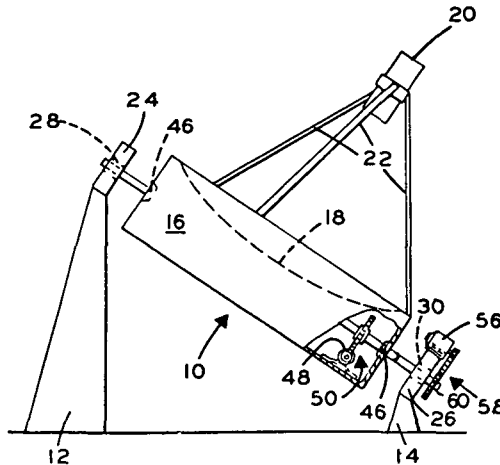
NASA Case No. MFS-23267  
Inventor: Lott W. Brantley, et al.  
Australia, Canada, France,  
Great Britain, Italy, Japan  
West Germany

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 4,011,854

Filed 1-29-76  
Issued 3-15-77

A mount for continuously orienting a collector dish relative to the sun in a system adapted to perform both diurnal and seasonal solar tracking. The mount is characterized by a rigid, angulated axle having a linear midportion supporting a collector dish, and oppositely extended end portions normally related to the midportion of the axle and received in spaced journals. The longitudinal axis of symmetry for said midportion of the axle is coincident with a diurnal axis paralleling the earth's polar axis. Drive means are provided for periodically displacing the axle about the diurnal axis at a substantially constant rate, while other drive means are provided for periodically indexing the dish through  $1^\circ$  about the seasonal axis, once during each of the earth's successive rotations about its polar axis, whereby the position of the dish relative to the axle is varied for accommodating seasonal tracking as changes in the angle of inclination of the polar axis occurs.





# POWER FACTOR CONTROL SYSTEM FOR AC INDUCTION MOTORS

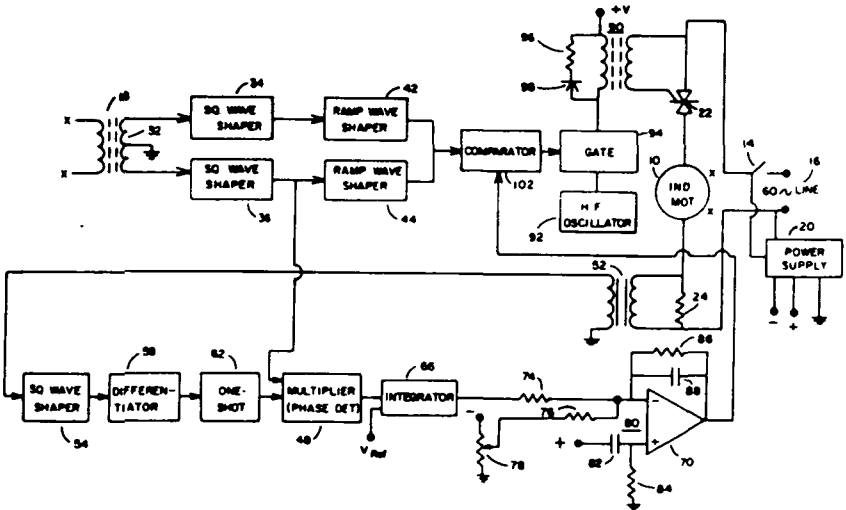
**NASA Case No. MFS-23280-1**  
**Inventor: Frank J. Nola**  
**Australia, Canada, France,**  
**Great Britain, Italy, Japan,**  
**The Netherlands, West Germany,**  
**Hong Kong, Singapore**

*Address inquiries to:*  
**Marshall Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: CC01**  
**Huntsville, AL 35812**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,052,648*

*Filed 7-19-76*  
*Issued 10-4-77*

A power factor control system for use with AC induction motors which samples line voltage and current through the motor and decreases power input to the motor proportional to the detected phase displacement between current and voltage to thereby provide less power to the motor, as it is less loaded.



# FIELD EFFECT TRANSISTOR AND METHOD OF CONSTRUCTION THEREOF

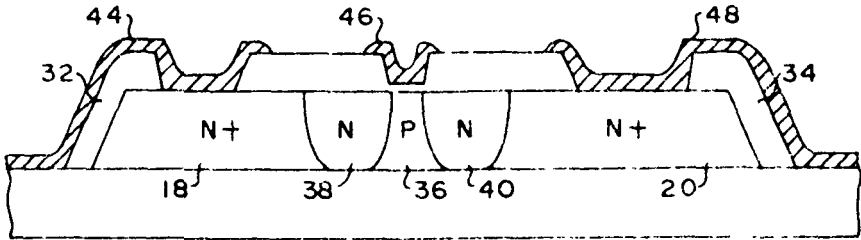
NASA Case No. MFS-23312  
Inventor: William Reynolds Feltner  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 4,087,902

Filed 6-23-76  
Issued 5-9-78

A field effect transistor and method of making the same wherein a semi-conductor layer is placed on an insulating substrate, and wherein the gate region is separated from source and drain regions of a like conductivity type to that of the source and drain regions but of reduced conductivity, the gate electrode and gate region of the layer being of generally reduced length, and the gate region being of greatest length on its surface closest to the gate electrode. This is accomplished by initially creating a relatively large gate region of one polarity, and then reversing the polarity of a central portion of this gate region by ion bombardment, thus achieving a narrower final gate region of the stated configuration.



## METHOD OF POST-PROCESS INTENSIFICATION OF IMAGES ON PHOTOGRAPHIC FILMS AND PLATES

NASA Case No. MFS-23461  
Inventor: Barbara Scott Askins  
Canada, France, Japan,  
Great Britain, Switzerland,  
West Germany

*Address inquiries to:*  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent No. 4,101,780*

*Filed 6-8-76  
Issued 7-18-78*

This invention is directed to a method of post-process photographic film or plates. The intensification process includes the steps of converting the silver of the developed film or plate to a radioactive compound by treatment with an aqueous alkaline solution of an organo-S<sup>35</sup> compound; placing the resulting activated film or plate in direct contact with a receiver film which is then exposed by radiation from the activated film; and developing and fixing the intensified image on the receiver film. The aqueous alkaline solution of the organo-S<sup>35</sup> compound will react directly with the photographic silver to produce activity levels suitable for autoradiography without the silver first being bleached to silver halide. A preferred organo-S<sup>35</sup> compound is thiourea-S<sup>35</sup>.

# WIND WHEEL ELECTRIC POWER GENERATOR

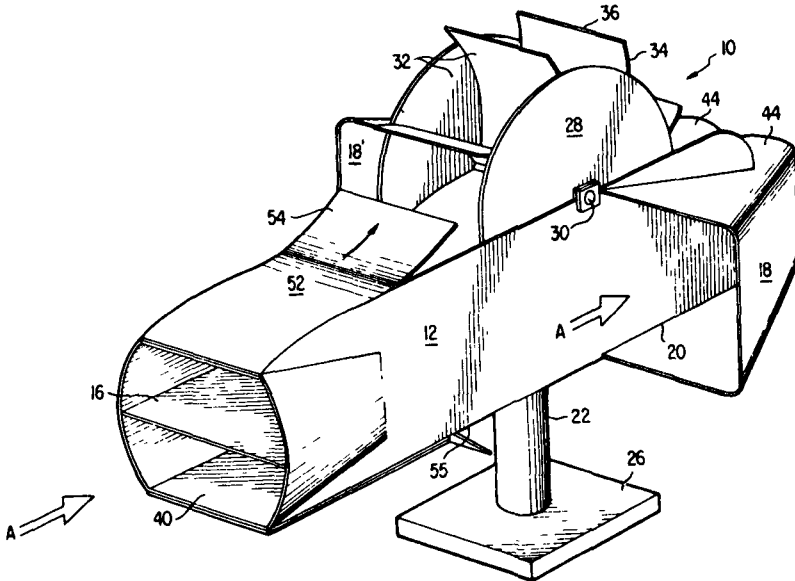
NASA Case No. MFS-23515-1  
Inventor: John W. Kaufman  
Canada

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 4,191,505

Filed 2-24-78  
Issued 3-4-80

Wind wheel electric power generator apparatus including a housing rotatably mounted upon a vertically disposed support column. Primary and auxiliary funnel-type, venturi ducts fixedly mounted upon the housing for capturing wind currents and conducting the same to a bladed wheel. Additional air flows are conducted onto the bladed wheel for effecting rotation of the wheel in a cumulative manner. The auxiliary ducts are disposed at an acute angle with respect to the longitudinal axis of the housing which permits capture of wind currents within a variable directional range.



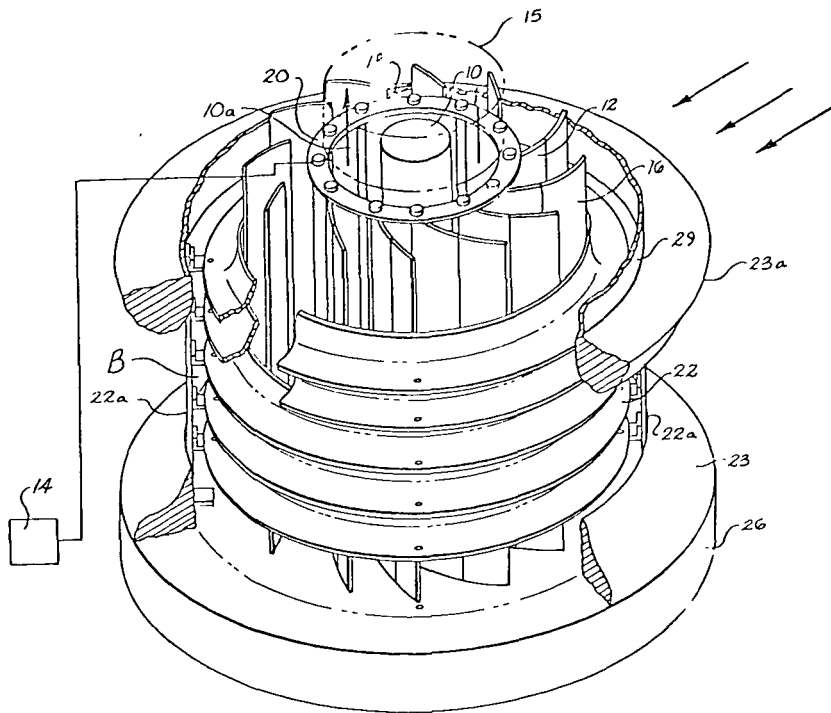
## AMPLIFIED WIND TURBINE APPARATUS

NASA Case No. MFS-23830-1  
Inventor: William N. Myers, et al.  
Australia, Canada, Japan,  
France, Italy, West Germany,  
Sweden, Switzerland,  
Belgium, Great Britain,  
The Netherlands

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

*Corresponding to U.S. Patent Application No. 129,780 Filed 3-12-80*

Amplified wind turbine apparatus wherein ambient inlet air is prerotated in a first air rotation chamber having a high pressure profile increasing the turbulence and Reynolds number thereof and a second rotation chamber adjacent and downstream of the turbine has a low pressure core profile whereby flow across the turbine is accelerated and thereafter exits the turbine apparatus through a draft anti-interference device which eliminates interference with ambient winds at the outlet of the turbine apparatus. Pivotal vanes controlled in response to prevailing wind direction admit air to the chambers and aid in imparting rotation. A central core may be utilized for creating the desired pressure profile in the first chamber.



# THREE PHASE POWER FACTOR CONTROLLER

NASA Case No. MFS-25,535-1

Inventor: Frank J. Nola

Australia, Canada, Denmark,

India, Ireland, Israel, Japan,

Korea, Mexico, New Zealand,

Norway, Philippines, South Africa,

Spain, Taiwan, Austria, Belgium,

France, West Germany, Great

Britain, Holland, Italy, Luxembourg,

Sweden, Switzerland

Address inquiries to:

Marshall Space Flight Center

Attn: Patent Counsel

Mail Code: CC101

Huntsville, AL 35812

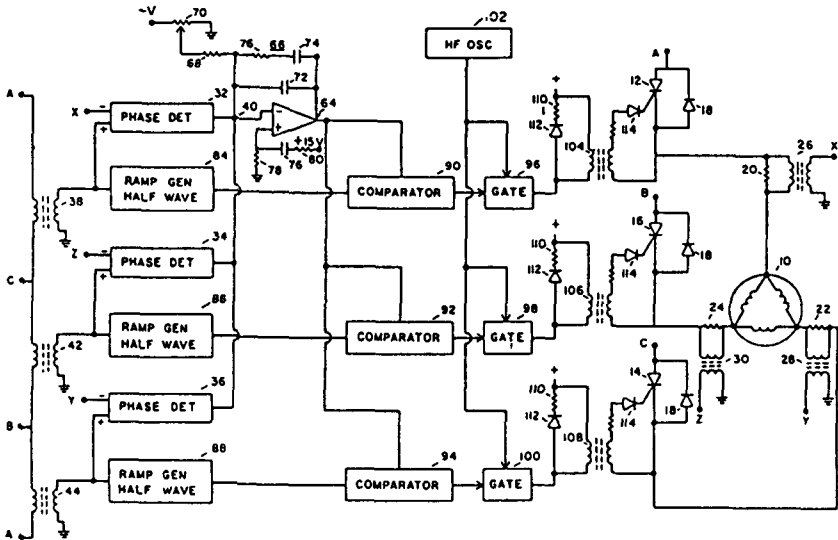
U.S.A.

Corresponding to U.S. Patent No. 4,433,276

Filed 10-23-80

Issued 2-21-84

A power control circuit for a three phase induction motor wherein power factors for the three phases are summed to provide a control signal, and this control signal is particularly filtered and then employed to control the duty cycle of each phase of input power to the motor.



# MOTOR POWER FACTOR CONTROLLER WITH A REDUCED VOLTAGE STARTER

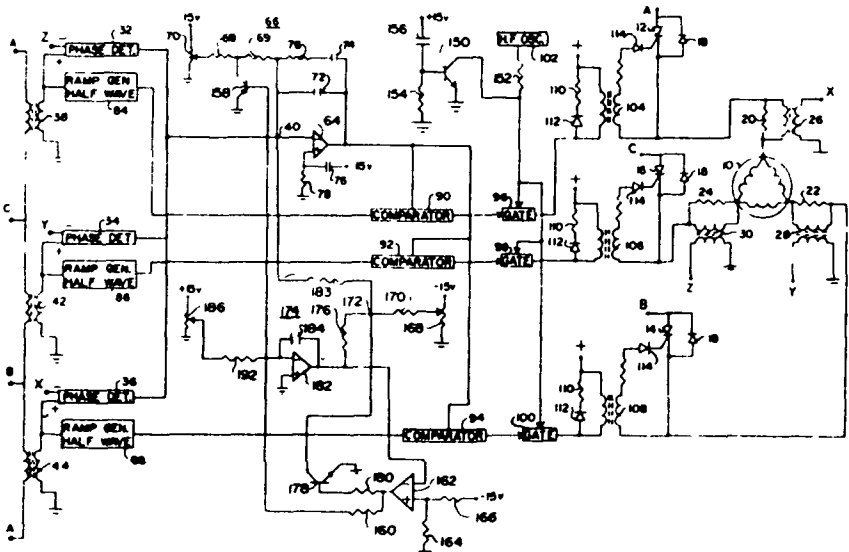
**NASA Case No. MFS-25,586-1**  
**Inventor: Frank J. Nola**  
 Australia, Canada, Hong Kong,  
 India, Ireland, Israel, Japan,  
 South Korea, Mexico, New Zealand,  
 Philippines, Singapore, Taiwan,  
 Austria, Belgium, West Germany,  
 France, Great Britain, Italy,  
 Luxembourg, The Netherlands,  
 Sweden, Switzerland

*Address inquiries to:*  
 Marshall Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: CC01  
 Huntsville, AL 35812  
 U.S.A.

*Corresponding to U.S. Patent No. 4,404,511*

*Filed 10-13-81*  
*Issued 9-13-83*

In a power factor type controller a signal is provided which initially blocks the application of the normal or "run" power factor command signal, and by means of a ramp signal generator, there is provided an increasing, with time, voltage in place of that command signal. This increase in voltage is of an amplitude and rate which will effect a graduated turn-on of the thyristor or thyristors of the motor circuit, effecting a full turn-on in a selected period of typically 5 to 30 seconds. A comparator examines the ramp voltage, and when the ramp voltage has risen sufficiently to effect a full turn-on of the thyristors and full motor operating speed, the comparator provides a signal which unblocks the normal power factor command signal, enabling the turn-on of a thyristor or thyristors to thereafter be determined by motor loading in a conventional manner.



# PULSED THYRISTOR TRIGGER CONTROL CIRCUIT

NASA Case No. MFS-25,616-1

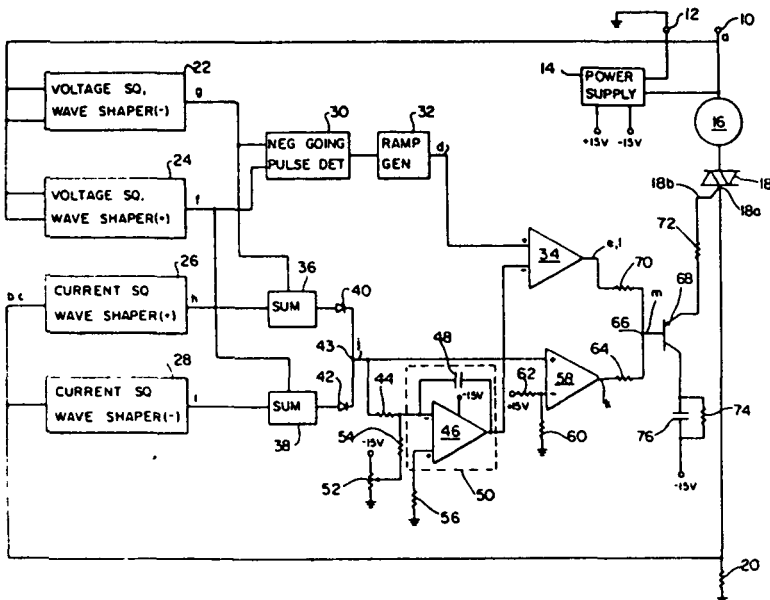
**Inventor: Frank J. Nola**  
**Australia, Canada, Denmark,**  
**Hong Kong, India, Ireland,**  
**Israel, Japan, South Korea,**  
**Mexico, New Zealand, Norway,**  
**Philippines, Singapore,**  
**South Africa, Spain, Taiwan,**  
**Austria, Belgium, West Germany,**  
**France, Great Britain, Italy,**  
**Luxembourg, The Netherlands,**  
**Sweden, Switzerland**

*Address inquiries to:*  
 Marshall Space Flight Center  
 Attn: Patent Counsel  
 Mail Code: CC01  
 Huntsville, AL 35812  
 U.S.A.

*Corresponding to U.S. Patent No. 4,426,614*

*Filed 11-30-81*  
*Issued 1-17-84*

A trigger control circuit is provided for producing firing pulses for the thyristor of thyristor control system such as a power factor controller. The control circuit overcomes thyristor triggering problems involved with the current lag associated with controlling inductive loads and utilizes a phase difference signal, already present in the power factor controller, in deriving a signal for inhibiting generation of a firing pulse until no load current is flowing from the preceding half cycle and thereby ensuring that the thyristor is triggered on during each half cycle.





# PROSTHETIC OCCLUSIVE DEVICE FOR AN INTERNAL PASSAGEWAY

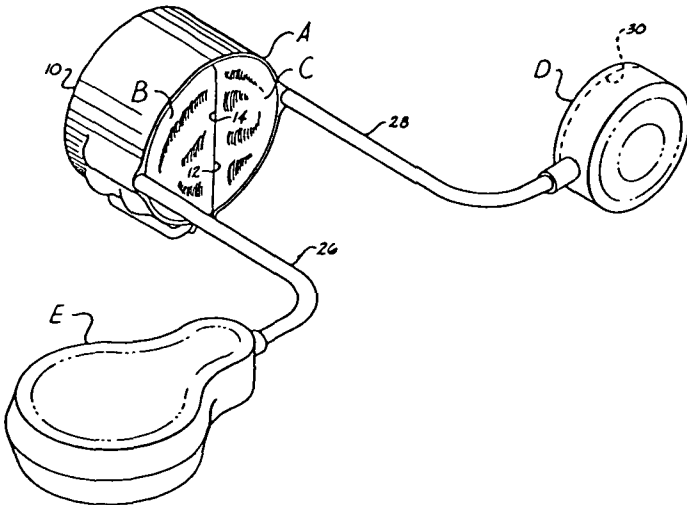
NASA Case No. MFS-25,740-1  
Inventor: John B. Tenney, Jr.  
Australia, Canada, Japan,  
Ireland, India, Belgium, France,  
West Germany, Great Britain,  
Italy, The Netherlands, Sweden,  
Switzerland

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 4,408,597

Filed 4-23-82  
Issued 10-11-83

An occlusive device is disclosed for surgical implant to occlude the lumen of an internal organ. The device includes a cuff A having a backing collar (10) and two isolated cuff chambers B and C. The fluid pressure of chamber B is regulated by a pump/valve reservoir unit E. Chamber C is unregulated in pressure but its fluid volume is adjusted by removing or adding fluid to a septum/reservoir D by means of a hypodermic needle. Pressure changes are transmitted between the two cuff chambers via faying surfaces (12) and (14) which are sufficiently large in contact area and thin as to transmit pressure generally without attenuation. By adjusting the fluid volume of septum D, the operating pressure of the device may be adjusted to accommodate tubular organs of different diameter sizes as well as to compensate for changes in the organ following implant without re-operation.



## WIDE DYNAMIC RANGE VIDEO CAMERA

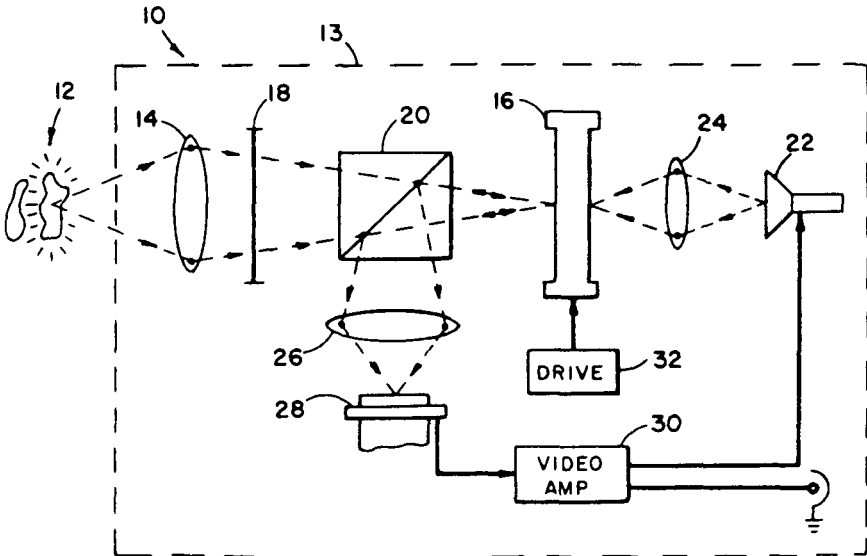
NASA Case No. MFS-25,750-1  
Inventor: Glenn D. Craig  
Australia, Belgium, Canada,  
France, West Germany, Great  
Britain, Italy, Japan,  
The Netherlands, Sweden,  
Switzerland, Taiwan

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent No. 4,546,248

Filed 9-8-83  
Issued 10-8-85

The invention is a television camera apparatus wherein bright objects are attenuated to fit within the dynamic range of the system, while dim objects are not. The apparatus receives linearly polarized light from an object scene, the light being passed by a beam splitter and focused on the output plane of a liquid crystal light valve. The light valve is oriented such that, with no excitation from the cathode ray tube, all light is rotated  $90^\circ$  and focused on the input plane of the video sensor. The light is then converted to an electrical signal, which is amplified by an amplifier and used to excite the CRT. The resulting image is collected and focused by lens onto a light valve which rotates the polarization vector of the light to an extent proportional to the light intensity from the CRT. The overall effect is to selectively attenuate the image pattern focused on the sensor.



## THREE-PHASE POWER FACTOR CONTROLLER WITH INDUCED EMF SENSING

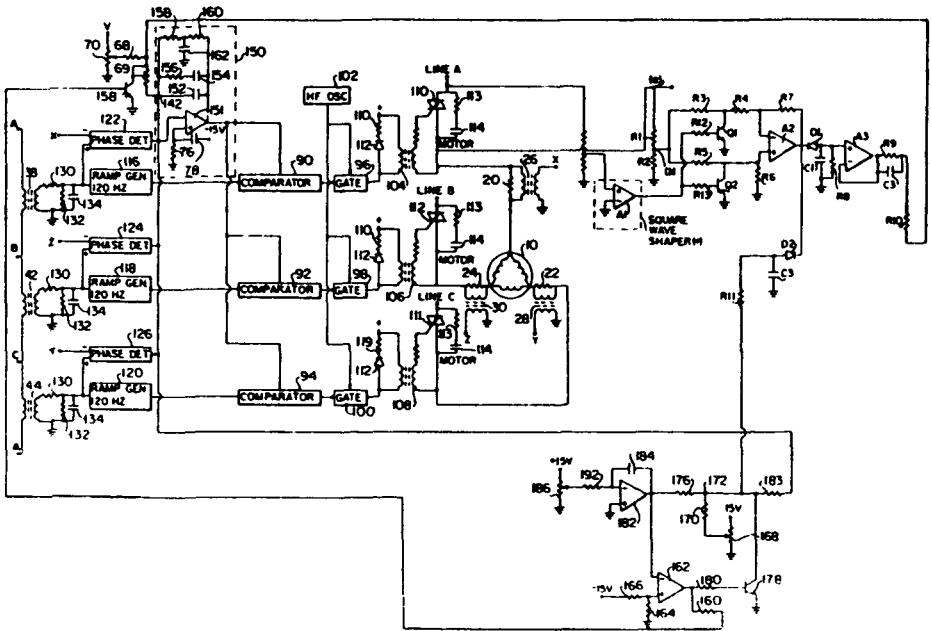
**NASA Case No. MFS-25,852-1**  
**Inventor: Frank J. Nola**  
**Australia, Austria, Belgium,**  
**Canada, France, West Germany,**  
**Great Britain, Hong Kong,**  
**India, Ireland, Israel, Italy,**  
**Japan, South Korea, Luxembourg,**  
**Mexico, The Netherlands**  
**Philippines, Singapore, South**  
**Africa, Sweden, Switzerland,**  
**Taiwan, New Zealand**

*Address inquiries to:*  
**Marshall Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: CC01**  
**Huntsville, AL 35812**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,469,998*

*Filed 12-16-82*  
*Issued 9-4-84*

A power factor controller for an A.C. induction motor is provided which is of the type comprising thyristor switches connected in series with the motor. The invention involves sensing the induced emf produced by the motor during the time interval when the thyristor is "off" and for producing a corresponding feedback signal for controlling switching of the thyristor. The sensed emf is also used to enhance "soft" starting of the motor.



# PHASE DETECTOR FOR THREE-PHASE POWER FACTOR CONTROLLER

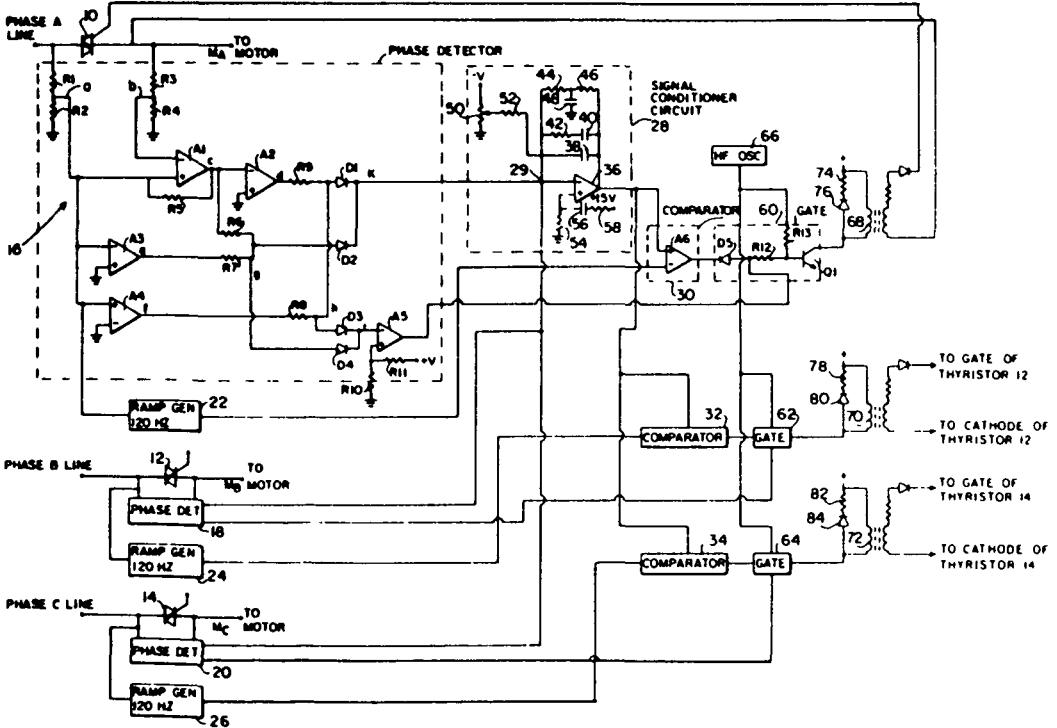
**NASA Case No. MFS-25,854-1**  
**Inventor: Frank J. Nola**  
**Australia, Austria, Belgium,**  
**Canada, France, West Germany,**  
**Great Britain, Hong Kong,**  
**India, Ireland, Israel, Italy,**  
**Japan, South Korea, Luxembourg,**  
**Mexico, The Netherlands,**  
**Philippines, Singapore, Sweden,**  
**Switzerland, Taiwan, New Zealand**

*Address inquiries to:*  
**Marshall Space Flight Center**  
**Attn: Patent Counsel**  
**Mail Code: CC01**  
**Huntsville, AL 35812**  
**U.S.A.**

*Corresponding to U.S. Patent No. 4,459,528*

*Filed 12-16-82*  
*Issued 7-10-84*

A phase-detector is provided for use in a power factor controller for a three-phase induction motor. The phase detector for each phase includes an operational amplifier which senses the current phase angle for that phase by sensing the voltage across the phase thyristor. Common mode rejection is achieved by providing positive feedback between the input and output of the voltage sensing operational amplifier.



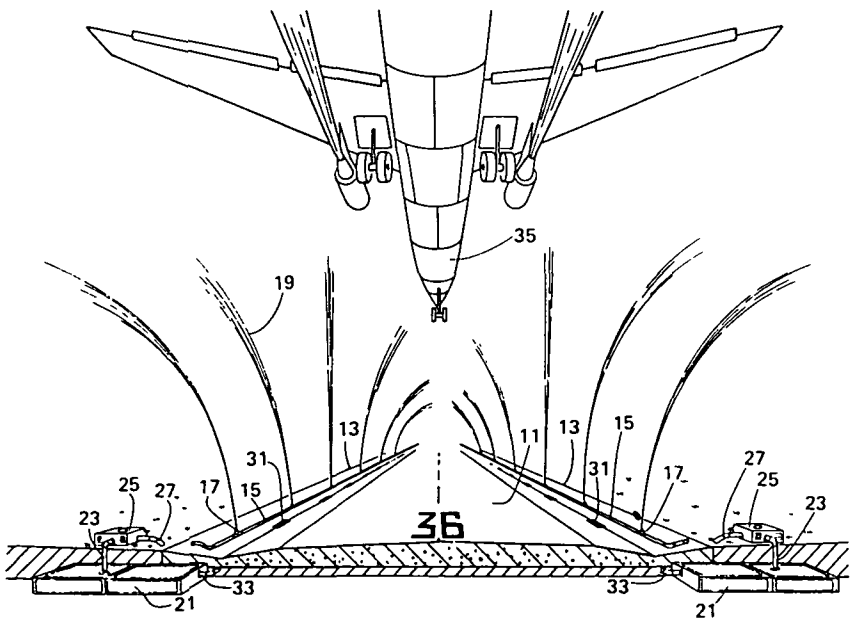
## WARM FOG DISSIPATION USING LARGE VOLUME WATER SPRAYS

NASA Case No. MFS-25,962-1  
Inventor: Vernon W. Keller  
Belgium, Canada, France,  
West Germany, Great Britain,  
Italy, Japan, The Netherlands,  
Sweden, Switzerland

Address inquiries to:  
Marshall Space Flight Center  
Attn: Patent Counsel  
Mail Code: CC01  
Huntsville, AL 35812  
U.S.A.

Corresponding to U.S. Patent Application No. 633,180 Filed 7-23-84

To accomplish the removal of warm fog about an area such as an airport runway. A plurality of nozzles along a line adjacent the area propel water jets through the fog to heights of approximately twenty-five meters. Each water jet breaks up forming a water drop size distribution that falls through the fog overtaking, colliding, and coalescing with individual fog droplets and thereby removing the fog. A water retrieval system is used to collect the water and return it to reservoirs for pumping it to the nozzles once again.



1. Report No. NASA SP-7038(08)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Significant NASA Inventions Available for Licensing in Foreign Countries		5. Report Date 1986	
		6. Performing Organization Code GP	
7. Author(s)		8. Performing Organization Report No.	
		10. Work Unit No.	
9. Performing Organization Name and Address Office of Assistant General Counsel for Patent Matters		11. Contract or Grant No.	
		13. Type of Report and Period Covered Special Publication	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546		14. Sponsoring Agency Code	
		15. Supplementary Notes	
16. Abstract  The foreign licensing program of the National Aeronautics and Space Administration serves to promote and utilize foreign patent rights vested in the Administration. The objective of this program is to extend the patent coverage on valuable NASA-owned inventions to various foreign countries. This publication provides basic information and drawings concerning items available for licensing in foreign countries.			
17. Key Words (Suggested by Author(s))  patents inventions		18. Distribution Statement  Unclassified - Unlimited  Subject Category 84	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 160	22. Price