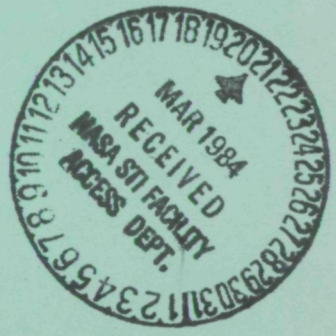
NASA SP-7039(24)
Section 1
Abstracts

# NASA PATENT ABSTRACTS BIBLIOGRAPHY




## A CONTINUING BIBLIOGRAPHY

### Section 1 • Abstracts

### JANUARY 1984

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

## ACCESSION NUMBER RANGES

| *Bibliography Number* | *STAR Accession Numbers* |
|---|---|
| NASA SP-7039(04) | N69-20701 – N73-33931 |
| NASA SP-7039(12) | N74-10001 – N77-34042 |
| NASA SP-7039(13) | N78-10001 – N78-22018 |
| NASA SP-7039(14) | N78-22019 – N78-34034 |
| NASA SP-7039(15) | N79-10001 – N79-21993 |
| NASA SP-7039(16) | N79-21994 – N79-34158 |
| NASA SP-7039(17) | N80-10001 – N80-22254 |
| NASA SP-7039(18) | N80-22255 – N80-34339 |
| NASA SP-7039(19) | N81-10001 – N81-21997 |
| NASA SP-7039(20) | N81-21998 – N81-34139 |
| NASA SP-7039(21) | N82-10001 – N82-22140 |
| NASA SP-7039(22) | N82-22141 – N82-34341 |
| NASA SP-7039(23) | N83-10001 – N83-23266 |
| NASA SP-7039(24) | N83-23267 – N83-37053 |

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NASA SP-7039(24)
Section 1
Abstracts

# NASA

# PATENT ABSTRACTS BIBLIOGRAPHY

## A CONTINUING BIBLIOGRAPHY

## Section 1 • Abstracts

Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in *Scientific and Technical Aerospace Reports (STAR)* between July 1983 and December 1983.

NASA Scientific and Technical Information Branch 1984
National Aeronautics and Space Administration
Washington, DC

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# INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

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

For the convenience of the user, each issue of *NASA PAB* has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in *STAR* since 1969. Thus a complete set of *NASA PAB* would consist of the Abstract Sections of Issue 04 (January 1974) and Issue 12 (January 1978) and the Abstract Section for all subsequent issues and the Index Section for the most recent issue.

The 167 citations published in this issue of the Abstract Section cover the period July 1983 through December 1983. The Index Section references over 4300 citations covering the period May 1969 through December 1983.

## ABSTRACT SECTION (SECTION 1)

This *PAB* issue incorporates the 1975 *STAR* category revisions which include 10 major subdivisions divided into 74 specific categories and one general category/division. (See Table of Contents for the scope note of each category under which are grouped appropriate NASA inventions.) This new scheme was devised in lieu of the 34 category divisions which were utilized in *PAB* supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a *STAR* citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned in *STAR* to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

*Abstract Citation Data Elements:* Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

NASA Accession Number
NASA Case Number
Inventor's Name
Title of Invention
U.S. Patent Application Serial Number
U.S. Patent Number (for issued patents only)
U.S. Patent Office Classification Number(s)
(for issued patents only)

These data elements in the citation of the abstract are depicted in the Typical Citation and Abstract reproduced on the following page and are also used in the indexes.

# TYPICAL CITATION AND ABSTRACT

NASA SPONSORED DOCUMENT

AVAILABLE ON MICROFICHE

NASA ACCESSION NUMBER

**N83-18025*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SOURCE

TITLE

**CHALCOGENOPHOSPHATE PHOTOELECTRODES Patent Application**

INVENTOR

Benjamin Reichman (Christopher Newport Coll.) and Charles E. Byvik, inventors (to NASA) Filed 7 Oct. 1982 14 p

US PATENT APPLICATIONS SERIAL NUMBER

NASA CASE NUMBER

(NASA-Case-LAR-12958-1; US-Patent-Appl-SN-433196) Avail:

AVAILABILITY

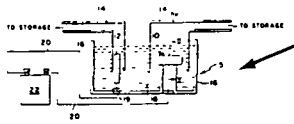
NTIS HC A02/MF A01 CSCL 10A

COSATI CODE

ABSTRACT

A device for converting light energy into other forms of useful energy such as electrical or chemical energy is described. A photoelectrode is manufactured from a layered chalcogenophosphate (MPX3) compound employed in a photoelectrochemical cell where M is selected from the group consisting of the transition metal series of elements beginning with scandium (atomic number 21) through germanium (atomic number 32), yttrium (atomic number 39) through antimony (atomic number 51), and lanthanum (atomic number 57) through polonium (atomic number 84); P is phosphorus; and X is selected from the chalogenide series consisiting of sulfur, selenium, and tellerium. The photoelectrochemical cell is comprised of a container which retains an acidic electrolyte solution, an MPX3 photoelectrode, and a counterelectrode. In the preferred embodiment, the photoelectrochemical cell is set up as a photoelectrolysis cell. NASA

KEY ILLUSTRATION



## INDEX SECTION (SECTION 2)

*The Index Section is divided into five indexes which are cross-indexed and are useful in locating a single* invention or groups of inventions.

Each of the five indexes utilizes basic data elements: (1) Subject Category Number, (2) NASA Accession Number, and (3) NASA Case Number, *in addition to other specific index terms.*

**Subject Index:** Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Inventor Index:** Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Source Index:** Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the NASA Accession Number.

**Number Index:** Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the NASA Accession Number.

**Accession Number Index:** Lists all inventions in order of ascending NASA Accession Number and indicates the related Subject Category Number.

## HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible when using the flexibility incorporated into the *NASA PAB.*

(1) *Using Subject Category:* To identify all NASA inventions in any one of the subject categories in this issue of *NASA PAB,* select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

(2) *Using Subject Index:* To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (i) use the Subject Category Number to locate the Subject Category and (ii) use the Accession Number to locate the desired invention within the Subject Category listing.

(3) *Using Patent Classification Index:* To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

# PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

Copies of U.S. patents may be purchased directly from the U.S. Patent and Trademark Office, Washington, D.C. 20231, for fifty cents a copy. When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($7.00 domestic; $14.00 foreign). Microfiche are sold at price code A01 ($4.50 domestic; $9.00 foreign). The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

# LICENSES FOR COMMERCIAL USE: INQUIRIES AND APPLICATIONS FOR LICENSE

NASA inventions, abstracted in *NASA PAB,* are available for nonexclusive or exclusive licensing in accordance with the NASA Patent Licensing Regulations. It is significant that all licenses for NASA inventions shall be by express written instruments and that no license will be granted or implied in a NASA invention except as provided in the NASA Patent Licensing Regulations.

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by U.S. patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the Assistant General Counsel for Patent Matters, Code GP-4, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the U.S. Patent Number or the U.S. Application Serial Number assigned to the invention as shown in *NASA PAB.*

The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table. Formal application of license must be submitted on the NASA Form, Application for NASA Patent License, which is available upon request from any NASA Patent Counsel.

| NASA Case Number Prefix Letters | Address of Cognizant NASA Patent Counsel |
|---|---|
| ARC-xxxxx<br>XAR-xxxxx | Ames Research Center<br>Mail Code: 200-11A<br>Moffett Field, California 94035<br>Telephone: (415)965-5104 |
| ERC-xxxxx<br>XER-xxxxx<br>HQN-xxxxx<br>XHQ-xxxxx | NASA Headquarters<br>Mail Code: GP-4<br>Washington, D.C. 20546<br>Telephone: (202)755-3954 |
| GSC-xxxxx<br>XGS-xxxxx | Goddard Space Flight Center<br>Mail Code: 204<br>Greenbelt, Maryland 20771<br>Telephone: (301)344-7351 |
| KSC-xxxxx<br>XKS-xxxxx | John F. Kennedy Space Center<br>Mail Code: PT-PAT<br>Kennedy Space Center, Florida 32899<br>Telephone: (305)867-2544 |
| LAR-xxxxx<br>XLA-xxxxx | Langley Research Center<br>Mail Code: 279<br>Hampton, Virginia 23365<br>Telephone: (804)827-8725 |
| LEW-xxxxx<br>XLE-xxxxx | Lewis Research Center<br>Mail Code: 500-318<br>21000 Brookpark Road<br>Cleveland, Ohio 44135<br>Telephone: (216)433-6346 |
| MSC-xxxxx<br>XMS-xxxxx | Lyndon B. Johnson Space Center<br>Mail Code: AL3<br>Houston, Texas 77058<br>Telephone: (713)483-4871 |
| MFS-xxxxx<br>XMF-xxxxx | George C. Marshall Space Flight Center<br>Mail Code: CC01<br>Huntsville, Alabama 35812<br>Telephone: (205)453-0020 |
| NPO-xxxxx<br>XNP-xxxxx<br>FRC-xxxxx<br>XFR-xxxxx<br>WOO-xxxxx | NASA Resident Legal Office<br>Mail Code: 180-801<br>4800 Oak Grove Drive<br>Pasadena, California 91103<br>Telephone: (213)354-2700 |

# PATENT LICENSING REGULATIONS

**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.



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 nay 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 practial 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;

(J) 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 the 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 modifications, 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 to 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, fact-finding 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]

BILLING CODE 7516-01-M

# FOREIGN PATENT LICENSING REGULATIONS

Selected NASA inventions are also available for licensing in countries other than the United States in accordance with the NASA Foreign Patent Licensing Regulation (14 C.F.R. 1245.4), a copy of which is available from any NASA Patent Counsel. For abstracts of NASA-owned inventions available for licensing in countries other than the United States, see NASA SP-7038, "Significant NASA Inventions Available for Licensing in Countries Other Than the United States." A copy of this NASA publication is available from NASA Headquarters, Code GP-4, Washington, D.C., 20546

# TABLE OF CONTENTS

## Section 1 • Abstracts

### AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*



### ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

## CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.



## ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*



## GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences.*

## LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

**51 LIFE SCIENCES (GENERAL)** 42
Includes genetics.

**52 AEROSPACE MEDICINE** 43
Includes physiological factors; biological effects of radiation; and weightlessness.

**53 BEHAVIORAL SCIENCES** N.A.
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

**54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT** N.A.
Includes human engineering; biotechnology; and space suits and protective clothing.

**55 PLANETARY BIOLOGY** N.A.
Includes exobiology; and extraterrestrial life.

## MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

**59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)** N.A.

**60 COMPUTER OPERATIONS AND HARDWARE** 44
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

**61 COMPUTER PROGRAMMING AND SOFTWARE** N.A.
Includes computer programs, routines, and algorithms.

**62 COMPUTER SYSTEMS** N.A.
Includes computer networks.

**63 CYBERNETICS** N.A.
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

**64 NUMERICAL ANALYSIS** N.A.
Includes iteration, difference equations, and numerical approximation.

**65 STATISTICS AND PROBABILITY** N.A.
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

**66 SYSTEMS ANALYSIS** N.A.
Includes mathematical modeling; network analysis; and operations research.

**67 THEORETICAL MATHEMATICS** N.A.
Includes topology and number theory.

## PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering.*

**70 PHYSICS (GENERAL)** N.A.
For geophysics see *46 Geophysics.* For astrophysics see *90 Astrophysics.* For solar physics see *92 Solar Physics.*

**71 ACOUSTICS** 45
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

**72 ATOMIC AND MOLECULAR PHYSICS** N.A.
Includes atomic structure and molecular spectra.

**73 NUCLEAR AND HIGH-ENERGY PHYSICS** N.A.
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

**74 OPTICS** 47
Includes light phenomena.

**75 PLASMA PHYSICS** N.A.
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

**76 SOLID-STATE PHYSICS** 50
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

**77 THERMODYNAMICS AND STATISTICAL PHYSICS** N.A.
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

## SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

**80 SOCIAL SCIENCES (GENERAL)** N.A.
Includes educational matters.

**81 ADMINISTRATION AND MANAGEMENT** N.A.
Includes management planning and research.

**82 DOCUMENTATION AND INFORMATION SCIENCE** **N.A.**

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

**83 ECONOMICS AND COST ANALYSIS** **N.A.**

Includes cost effectiveness studies.

**84 LAW AND POLITICAL SCIENCE** **N.A.**

Includes space law; international law; international cooperation; and patent policy.

**85 URBAN TECHNOLOGY AND TRANSPORTATION** **N.A.**

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

## SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.

For related information see also *Geosciences.*

**88 SPACE SCIENCES (GENERAL)** **N.A.**

**89 ASTRONOMY** **N.A.**

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

**90 ASTROPHYSICS** **N.A.**

Includes cosmology; and interstellar and interplanetary gases and dust.

**91 LUNAR AND PLANETARY EXPLORATION** **N.A.**

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

**92 SOLAR PHYSICS** **N.A.**

Includes solar activity, solar flares, solar radiation and sunspots.

**93 SPACE RADIATION** **N.A.**

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

## GENERAL

**99 GENERAL** **N.A.**

**Note: N.A. means that no abstracts were assigned to this category for this issue.**

## Section 2 • Indexes

*JANUARY 1984 (Supplement 24)*

# NASA Patent Abstracts Bibliography

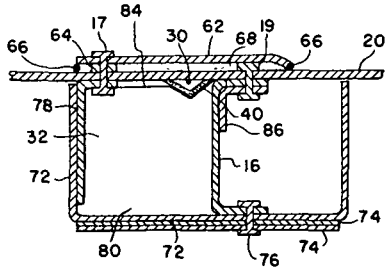
*A Semiannual Publication of the National Aeronautics and Space Administration*

## 01 AERONAUTICS (GENERAL)

**N83-35992*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**EXPLOSIVELY ACTIVATED EGRESS AREA Patent**
L. J. BEMENT (LTV Aerospace Corp., Hampton, Va.) and J. W. BAILEY, inventors (to NASA) (LTV Aerospace Corp., Hampton, Va.) 4 Oct. 1983 10 p Filed 30 Apr. 1981 Supersedes N81-29107 (19 - 20, p 2722) Sponsored by NASA (NASA-CASE-LAR-12624-1; US-PATENT-4,407,468; US-PATENT-APPL-SN-259209; US-PATENT-CLASS-244-137P; US-PATENT-CLASS-89-1B; US-PATENT-CLASS-102-378) Avail: US Patent and Trademark Office CSCL 01B

A lightweight, add on structure which employs linear shaped pyrotechnic charges to smoothly cut an airframe along an egress area periphery is provided. It compromises reaction surfaces attached to the exterior surface of the airframe's skin and is designed to restrict the skin deflection. That portion of the airframe within the egress area periphery is jettisoned. Retention surfaces and sealing walls are attached to the interior surface of the airframe's skin and are designed to shield the interior of the aircraft during detonation of the pyrotechnic charges.

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




## 02 AERODYNAMICS

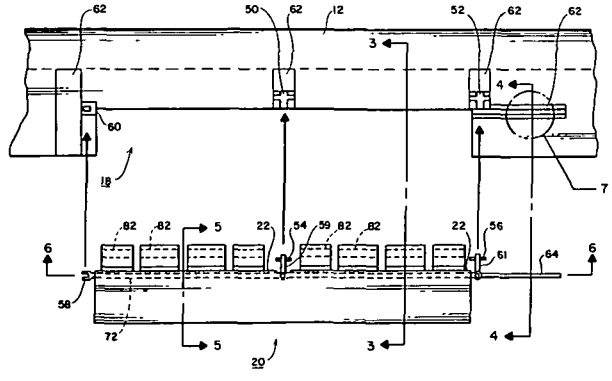
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

**N83-25663*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**ROTOR BLADE WITH PASSIVE TUNED TAB Patent Application**
T. G. CAMPBELL, inventor (to NASA) (Sikorsky Aircraft, Stratford, Conn.) 28 Apr. 1983 21 p Sponsored by NASA (NASA-CASE-ARC-11444-1; US-PATENT-APPL-SN-489675)
Avail: NTIS HC A02/MF A01 CSCL 01A

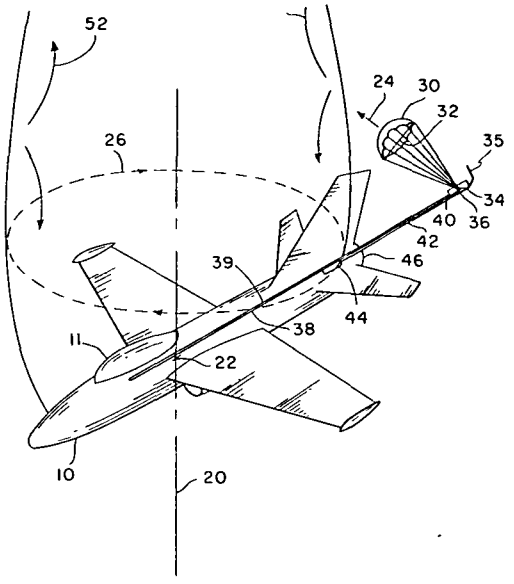
A structure for reducing vibratory airloading in a rotor blade with a leading edge and a trailing edge includes a cut-out portion at the trailing edge. A substantially wedge shaped cross-section, inertially deflectable tab, also having a leading edge and a trailing edge is pivotally mounted in the cut-out portion. The trailing edge of the tab may move above and below the rotor blade. A torsion strap applies force against the tab when the trailing edge of the tab is above and below the rotor blade. A restraining member is slidably movable along the torsion strap to vary torsional biasing force supplied by the torsion bar to the tab. A plurality of movable weights positioned between plates and vary a center of gravity of the tab. Skin of the tab is formed from unidirectional graphite and fiberglass layers. Sliders, coupled with a pinned degree of freedom at rod eliminate bending of tab under edgewise blade deflection.

Author



**N83-29173*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**EXTENDED MOMENT ARM ANTI-SPIN DEVICE Patent Application**
R. D. WHIPPLE, inventor (to NASA) 27 Jun. 1983 14 p
(NASA-CASE-LAR-12979-1; US-PATENT-APPL-SN-508371)
Avail: NTIS HC A02/MF A01 CSCL 01A

A device which corrects aerodynamic spin with collapsible boom which extends an aircraft moment arm, and an antispin parachute force that is exerted upon the end of the moment arm to correct intentional or inadvertent aerodynamic spin is described. This configuration effects spin recovery by means of a parachute whose required diameter decreases as an inverse function of the increasing length of the moment arm. The collapsible boom enables the parachute to avoid the aircraft wake without mechanical assistance, retracts to permit steep takeoff, and permits a parachute to correct spin while minimizing associated aerodynamic, structural and in-flight complications. NASA




# 05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

**N83-27975*** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
**ADAPTER FOR MOUNTING A MICROPHONE FLUSH WITH THE EXTERNAL SURFACE OF THE SKIN OF A PRESSURIZED AIRCRAFT Patent**
R. B. COHN, inventor (to NASA) 14 Jun. 1983 6 p Filed 14 Dec. 1981 Supersedes N82-24474 (20 - 15, p 2086)
(NASA-CASE-FRC-11072-1; US-PATENT-4,388,502; US-PATENT-APPL-SN-230613; US-PATENT-CASE-179-179; US-PATENT-CASE-179-146-R; US-PATENT-CASE-367-906)
Avail: US Patent and Trademark Office CSCL 01C

A mounting device for securing a microphone pick up head flush with respect to the external surfaces of the skin of an aircraft for detecting shock waves passing thereover is described. The mount includes a sleeve mounted internally of the aircraft for capturing and supporting an electronics package having the microphone pick up head attached thereto in a manner such that the head is flush with the external surface of the aircraft skin and a pressure seal is established between the internal and external surfaces of the aircraft skin.

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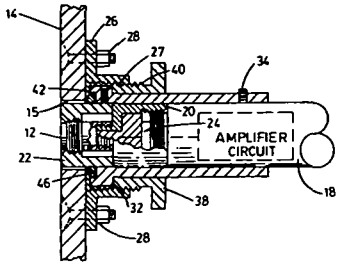



**N83-29197*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**PIEZOELECTRIC DEICING DEVICE Patent Application**
R. C. FINK and B. A. BANKS, inventors (to NASA) 25 Feb. 1983 10 p
(NASA-CASE-LEW-13773-1; US-PATENT-APPL-SN-469867)
Avail: NTIS HC A02/MF A01 CSCL 01C

A fast voltage pulse is applied to a transducer which comprises a composite of multiple layers of alternately polarized piezoelectric material. These layers are bonded together and positioned over the curved leading edge of an aircraft wing structure. Each layer is relatively thin and metallized on both sides. The strain produced in the transducer causes the composite to push forward resulting in detachment and breakup of ice on the leading edge of the aircraft wing. NASA

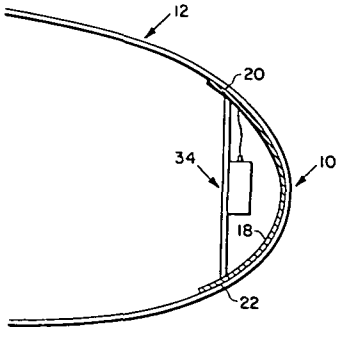
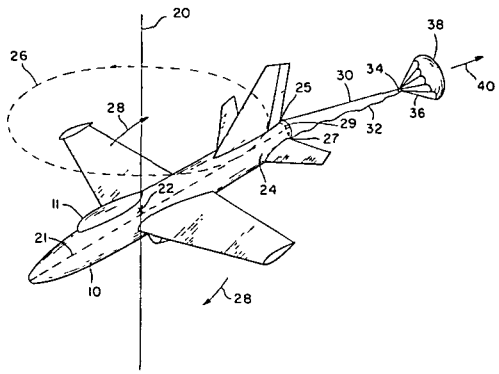



FIG. 1

**N83-34934*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**DUAL TOWLINE ANTI-SPIN DEVICE Patent Application**
W. L. WHITE, inventor (to NASA) 15 Sep. 1983 15 p
(NASA-CASE-LAR-13076-1; US-PATENT-APPL-SN-532342)
Avail: NTIS HC A02/MF A01 CSCL 01C

A device which corrects aerodynamic spin with a parachute that exerts anti-spin forces on an aircraft to effect spin recovery is described. The dual parachute towlines are each attached to the parachute and are attached to the rear fuselage equidistant to and on opposite sides of the aircraft centerline. As the parachute is deployed during spin, the parachute force acts through only the towline, and exerts its force outboard of center on the aircraft. As a result, the parachute exerts not only an anti-spin torque, but additionally causes the aircraft to roll, creating a gyroscopic anti-spin rolling moment. The additional and anti-spin rolling moment facilitates spin recovery by permitting a relatively smaller parachute to accomplish spin recovery equivalent to that of a larger parachute attached to the center of the rear fuselage.

NASA




# 06 AIRCRAFT INSTRUMENTATION

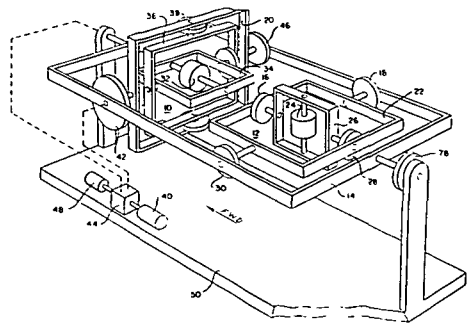
Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

**N83-33882*** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
**AIRCRAFT BODY-AXIS ROTATION MEASUREMENT SYSTEM Patent**
K. T. COWDIN, inventor (to NASA) 14 Jun. 1983 10 p Filed 11 Mar. 1981 Supersedes N81-22048 (19 - 13, p 1718)
(NASA-CASE-FRC-11043-1; US-PATENT-4,387,513;
US-PATENT-APPL-SN-242790; US-PATENT-CLASS-33-322;
US-PATENT-CLASS-74-5.34) Avail: US Patent and Trademark Office CSCL 01D

A two gyro four gimbal attitude sensing system having gimbal lock avoidance is provided with continuous azimuth information, rather than roll information, relative to the magnetic cardinal headings while in near vertical attitudes to allow recovery from vertical on a desired heading. The system is comprised of a means for stabilizing an outer roll gimbal that is common to a vertical gyro and a directional gyro with respect to the aircraft platform which is being angularly displaced about an axis substantially parallel to the outer roll gyro axis. A means is also provided for producing a signal indicative of the magnitude of such displacement as an indication of aircraft heading. Additional means are provided to cause stabilization of the outer roll gimbal whenever the pitch angle of the aircraft passes through a threshold prior to entering vertical flight and destabilization of the outer roll gimbal upon passing through the threshold when departing vertical flight.

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



# 07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

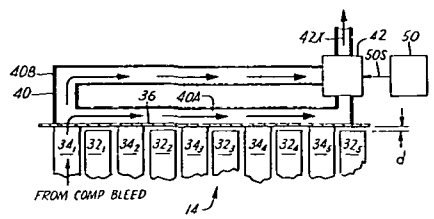
For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

**N83-31603*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**CONTROL MEANS FOR A GAS TURBINE ENGINE Patent**
R. S. BEITLER (General Electric Co., Cincinnati), F. J. SELLERS (General Electric Co., Cincinnati), and G. W. BENNETT, inventors (to NASA) (General Electric Co., Cincinnati) 6 Jul. 1983 10 p Filed 26 Jun. 1980
(NASA-CASE-LEW-14586-1; US-PATENT-4,338,061;
US-PATENT-APPL-SN-163122; US-PATENT-CLASS-415-1;
US-PATENT-CLASS-415-47; US-PATENT-CLASS-415-175;
US-PATENT-CLASS-415-178) Avail: US Patent and Trademark Office CSCL 21E

A means is provided for developing a signal representative of the actual compressor casing temperature, a second signal representative of compressor inlet gas temperature, and a third signal representative of compressor speed. Another means is provided for receiving the gas temperature and compressor speed signals and developing a schedule output signal which is a representative of a reference casing temperature at which a predetermined compressor blade stabilized clearance is provided. A means is also provided for comparing the actual compressor casing temperature signal and the reference casing temperature signal and developing a clearance control system representative of the difference. The clearance control signal is coupled to a control valve which controls a flow of air to the compressor casing

to control the clearance between the compressor blades and the compressor casing. The clearance control signal can be modified to accommodate transient characteristics. Other embodiments are disclosed.

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

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**N83-33884*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**NOISE SUPPRESSOR FOR TURBO FAN JET ENGINES Patent**

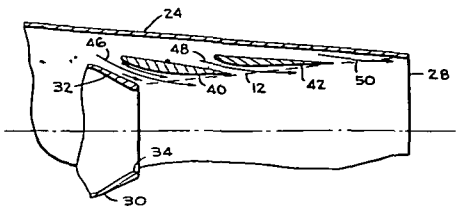
D. Y. CHENG, inventor (to NASA) (Santa Clara Univ., Calif.) 8 Feb. 1983 8 p Filed 13 Feb. 1976 Supersedes N76-118131 (15 - 9, p 1082) Sponsored by NASA

(NASA-CASE-ARC-10812-1; US-PATENT-4,372,110; US-PATENT-APPL-SN-657903; US-PATENT-CLASS-60-262; US-PATENT-CLASS-60-269; US-PATENT-CLASS-60-271; US-PATENT-CLASS-239-265.17; US-PATENT-CLASS-181-213)

Avail: US Patent and Trademark Office CSCL 21E

A noise suppressor is disclosed for installation on the discharge or aft end of a turbo fan engine. Within the suppressor are fixed annular airfoils which are positioned to reduce the relative velocity between the high temperature fast moving jet exhaust and the low temperature slow moving air surrounding it. Within the suppressor nacelle is an exhaust jet nozzle which constrains the shape of the jet exhaust to a substantially uniform elongate shape irrespective of the power setting of the engine. Fixed ring airfoils within the suppressor nacelle therefore have the same salutary effects irrespective of the power setting at which the engine is operated.

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

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**N83-36029*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**APPARATUS FOR IMPROVING THE FUEL EFFICIENCY OF A GAS TURBINE ENGINE Patent**

G. A. COFFINBERRY, inventor (to NASA) (GE, Cincinnati) 20 Sep. 1983 7 p Filed 20 Mar. 1980 Supersedes N83-14130 (21 - 05, p 0622) Sponsored by NASA

(NASA-CASE-LEW-13142-1; US-PATENT-4,404,793; US-PATENT-APPL-SN-132364; US-PATENT-CLASS-60-39.07)

Avail: US Patent and Trademark Office CSCL 21E

An energy recovery system is provided for an aircraft gas turbine engine of the type in which some of the pneumatic energy developed by the engine is made available to support systems such as an environmental control system. In one such energy recovery system, some of the pneumatic energy made available to but not utilized by the support system is utilized to heat the engine fuel immediately prior to the consumption of the fuel by the engine. Some of the recovered energy may also be utilized to heat the fuel in the fuel tanks. Provision is made for multiengine applications wherein energy recovered from one engine may be utilized by another one of the engines or systems associated therewith.

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# 09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

**N83-25727*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

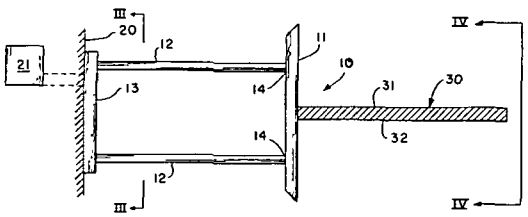
**MODEL MOUNT SYSTEM FOR TESTING FLUTTER Patent Application**

M. G. FARMER, inventor (to NASA) 31 Mar. 1983 15 p

(NASA-CASE-LAR-12950-1; US-PATENT-APPL-SN-481106)

Avail: NTIS HC A02/MF A01 CSCL 14B

A wind tunnel model mount system is described for effectively and accurately determining the effects of angle of attack and airstream velocity on a model airfoil or aircraft. The model mount system includes a rigid model attached to a splitter plate which is supported away from the wind tunnel wall by a plurality of flexible rods. Conventional instrumentation is employed to effect model rotation through turntable and to record model flutter data as a function of the angle of attack versus dynamic pressure. NASA

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# 17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

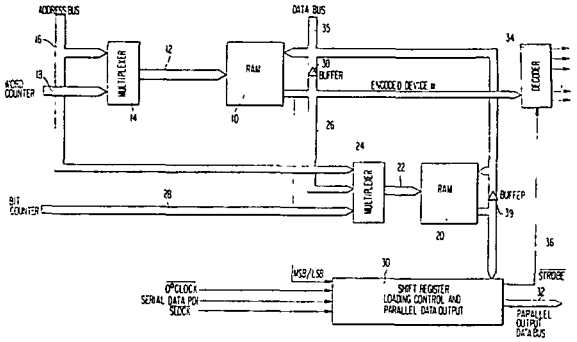
For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

**N83-29302*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**MEMORY-BASED PARALLEL DATA OUTPUT CONTROLLER Patent Application**

R. J. STRATTEL and J. K. NISWANDER, inventors (to NASA) 18 May 1983 20 p
(NASA-CASE-GSC-12447-2; US-PATENT-APPL-SN-501060)
Avail: NTIS HC A02/MF A01 CSCL 09F

A memory-based parallel data output controller employs associative memories and memory mapping to decommutate multiple channels of telemetry data. The output controller contains a random access memory (RAM) which has at least as many address locations as there are channels. A word counter addresses the RAM which provides as its outputs an encoded peripheral device number and a MSB/LSB-first flag. The encoded device number and a bit counter address a second RAM which contains START and STOP flags to pick out the required bits from the specified word number. The LSB/MSB, START and STOP flags, along with the serial input digital data go to a control block which selectively fills a shift register used to drive the parallel data output bus. NASA



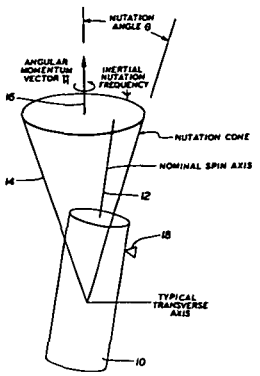

# 18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

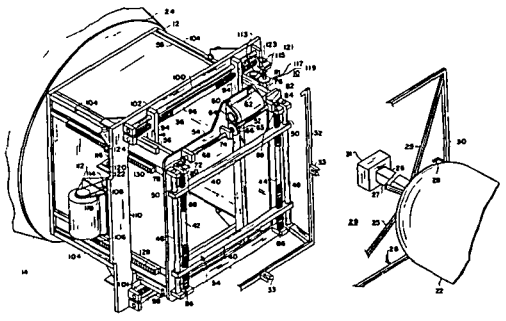
**N83-28064*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**METHOD OF DAMPING NUTATION MOTION WITH MINIMUM SPIN AXIS ATTITUDE DISTURBANCE Patent**
H. C. HOFFMAN, inventor (to NASA) 7 Jun. 1983 10 p Filed 29 Aug 1980 Supersedes N81-12156 (19 - 03, p 0314)
(NASA-CASE-GSC-12551-1; US-PATENT-4,386,750;
US-PATENT-APPL-SN-182881; US-PATENT-CLASS-244-169;
US-PATENT-CLASS-244-170) Avail: US Patent and Trademark Office CSCL 22B

In a method of and apparatus for damping nutation of a spinning spacecraft, spin axis attitude disturbances are substantially reduced by controlling at least one nutation damping gas thruster to fire with nonuniform gas pulses. During the beginning of a nutation control sequence, the duration of successive gas pulses is gradually increased (up pulsed) from zero to a predetermined maximum duration. The duration of successive pulses is then maintained constant for a time period. Finally, at the end of the nutation control sequence, the duration of successive gas pulses is gradually reduced to zero (down pulsed). Up pulsing of the gas thruster is initiated in response to a predetermined maximum nutation angle measured by an accelerometer. Down pulsing of the thruster is initiated in response to a predetermined minimum nutation angle.
Official Gazette of the U.S. Patent and Trademark Office




**N83-29303*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**SATELLITE RETRIEVAL SYSTEM Patent**
E. C. PRUETT (Essex Corp., Huntsville, Ala.), K. B. ROBERTSON (Essex Corp., Huntsville, Ala.), and T. E. LOUGHEAD, inventors (to NASA) (Essex Corp., Huntsville, Ala.) 5 Jul. 1983 7 p Filed 30 Mar. 1981 Supersedes N81-24164 (19 - 15, p 2023) Sponsored by NASA
(NASA-CASE-MFS-25403-1; US-PATENT-4,391,423;
US-PATENT-APPL-SN-248745; US-PATENT-CLASS-244-161;
US-PATENT-CLASS-244-115; US-PATENT-CLASS-269-152;
US-PATENT-CLASS-269-242; US-PATENT-CLASS-269-244;
US-PATENT-CLASS-294-86R) Avail: US Patent and Trademark Office CSCL 22B

A satellite retrieval system with first and second pairs of coacting parallel bars are separately mounted in spaced parallel planes on the front of a spacecraft. The bars of one pair are at right angles to bars of the other pair, and together the two pairs of bars effect a variable aperture adapted to close around a rod extending from a second spacecraft to effect the capture of the latter.
Official Gazette of the U.S. Patent and Trademark Office



# 23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

**N83-28076*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**THE 1 - (DIALKOXYPHOSPHONYL)METHYL -2,4- AND -2,6-DINITRO- AND DIAMINO BENZENES AND THEIR DERIVATIVES Patent Application**
J. A. MIKROYANNIDIS (National Research Council, Washington) and D. A. KOURTIDES, inventors (to NASA) 12 May 1983 11 p
(NASA-CASE-ARC-11425-1; US-PATENT-APPL-SN-493864)
Avail: NTIS HC A02/MF A01 CSCL 07A

The compounds, 1-(Dialkoxyphosphonyl)methyl -1,4- and -1,6-dinitro- and diamino benzenes are prepared by nitrating a (phosphonyl) methyl benzene to produce the dinitro compounds which are then reduced to the diamino compounds. The diamino compounds may be polymerized with dianhydrides or diacyl halides to produce fire resistant polymers. NASA

# 24 COMPOSITE MATERIALS

Includes laminates.

**N83-25789*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**METHOD OF CARBONIZING POLYACRYLONITRILE FIBERS Patent**
D. E. CAGLIOSTRO and N. R. LERNER, inventors (to NASA) 24 May 1983 4 p Filed 10 Jul. 1981
(NASA-CASE-ARC-11261-1; US-PATENT-4,385,043; US-PATENT-APPL-SN-282129; US-PATENT-CLASS-423-447.6; US-PATENT-CLASS-423-447.2; US-PATENT-CLASS-423-447.7)
Avail: US Patent and Trademark Office CSCL 11D

This invention relates to a method of carbonizing polyacrylonitrile fibers by exposing the fibers at an elevated temperature to an oxidizing atmosphere; then exposing the oxidized fibers to an atmosphere of an inert gas such as nitrogen containing a carbonaceous material such as acetylene. The fibers are preferably treated with an organic compound, for example benzoic acid, before the exposure to an oxidizing atmosphere. The invention also relates to the resulting fibers. The treated fibers have enhanced tensile strength.

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

**N83-25791*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**TOUGHENING REINFORCED EPOXY COMPOSITES WITH BROMINATED POLYMERIC ADDITIVES Patent Application**
W. J. GILWEE and Z. NIR, inventors (to NASA) 12 May 1983 29 p
(NASA-CASE-ARC-11427-1; US-PATENT-APPL-SN-493865)
Avail: NTIS HC A03/MF A01 CSCL 11D

Cured polyfunctional epoxy resins including tris(hydroxyphenyl)methane triglycidyl ether are toughened by addition of polybrominated polymeric additives having an EE below 1500 to the precure composition. Carboxy terminated butadiene-acrylonitrile rubber is optionally present in the precure mixture as such or as a preformed copolymer with other reactants. Reinforced composites, particularly carbon reinforced composites, of these resins are disclosed and shown to have improved toughness. NASA

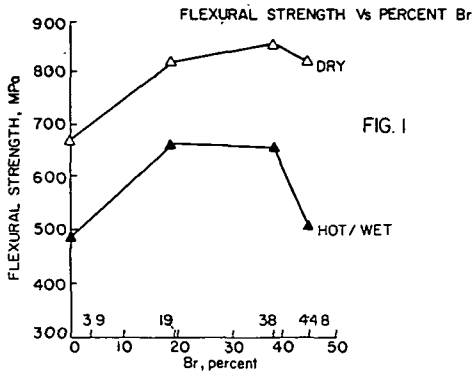
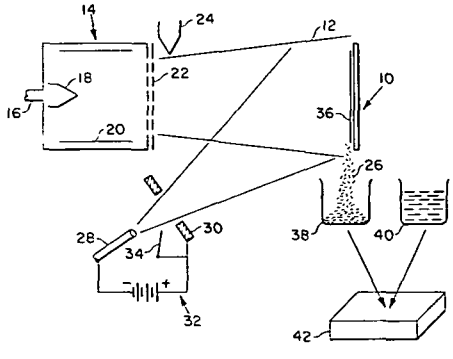


FIG. 1

**N83-28095*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
***DIAMONDLIKE FLAKE COMPOSITES Patent Application***
B. A. BANKS, inventor (to NASA) 17 May 1983 10 p
(NASA-CASE-LEW-13837-1; US-PATENT-APPL-SN-495381)
Avail: NTIS HC A02/MF A01 CSCL 11D

A carbon coating is vacuum arc deposited on a smooth surface of a target which is simultaneously ion beam sputtered. The bombarding ions have sufficient energy to create diamond bombs. Spalling occurs as the carbon deposit thickens. The resulting diamond like carbon flakes are mixed with a binder or matrix material to form a composite material having improved thermal, electrical, mechanical, and tribological properties when used in aerospace structures and components. NASA




**N83-33950*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**MIXED POLYVALENT-MONOVALENT METAL COATING FOR CARBON-GRAPHITE FIBERS Patent**
J. HARPER-TERVET (JPL, California Inst. of Tech., Pasadena), F. W. TERVET (JPL, California Inst. of Tech., Pasadena), and M. F.

HUMPHREY, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 16 Nov. 1982 5 p Filed 30 Jun. 1980
(NASA-CASE-NPO-14987-1; US-PATENT-4, 359,503;
US-PATENT-APPL-SN-164-584; US-PATENT-CLASS-428-367;
US-PATENT-CLASS-427-215; US-PATENT-CLASS-427-241;
US-PATENT-CLASS-428-375; US-PATENT-CLASS-428-392;
US-PATENT-CLASS-428-902; US-PATENT-CLASS-428-903)
Avail: US Patent and Trademark Office CSCL 11D

An improved coating of gasification catalyst for carbon-graphite fibers is provided comprising a mixture of a polyvalent metal such as calcium and a monovalent metal such as lithium. The addition of lithium provides a lighter coating and a more flexible coating when applied to a coating of a carboxyl containing resin such as polyacrylic acid since it reduces the crosslink density. Furthermore, the presence of lithium provides a glass-like substance during combustion which holds the fiber together resulting in slow, even combustion with much reduced evolution of conductive fragments. The coated fibers are utilized as fiber reinforcement for composites.

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# 25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

**N83-24572*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**STABILIZED LANTHANUM SULPHUR COMPOUNDS Patent Application**
G. H. REYNOLDS (JPL, California Inst. of Tech., Pasadena), N. B. ELSNER (JPL, California Inst. of Tech., Pasadena), and C. H. SHEARER, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 28 Jan. 1983 7 p
(Contract NAS7-100)
(NASA-CASE-NPO-16135-1; US-PATENT-APPL-SN-470114)
Avail: NTIS HC A02/MF A01 CSCL 07C

Lanthanum sulfide is maintained in the stable cubic phase form over a temperature range of from 500 C to 1500 C by adding to it small amounts of calcium, barium, or strontium. This compound is an excellent thermoelectric material. NASA

**N83-25811*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**PROCESS FOR PRODUCING TRIS (N-METHYLAMINO) METHYLSILANE Patent Application**
J. M. CLEMONS, B. G. PENN, and F. E. LEDBETTER, inventors (to NASA) 9 May 1983 12 p
(NASA-CASE-MFS-25721-1; US-PATENT-APPL-SN-492963)
Avail: NTIS HC A02/MF A01 CSCL 07D

A method of producing tris (N-methylamine) methylsilane, including the steps of forming and cooling a liquid solution of methylamine in an inert solvent and under an inert atmosphere at a temperature of about -30 C and slowly adding a quantity of methyltrichlorosilane while maintaining said temperature. The reaction mixture is then heated for about 60 minutes at a temperature of about 40 C, followed by filtering the solid portion from the liquid portion. The liquid is distilled to remove the solvent, resulting in a high yield of tris (N-methylamine) methylsilane.

NASA

**N83-29324*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**COOLING BY CONVERSION OF PARA TO ORTHO-HYDROGEN Patent**
A. SHERMAN, inventor (to NASA) 12 Jul. 1983 9 p Filed 10 Sep. 1981 Supersedes N82-10358 (20 - 01, p 0052)
(NASA-CASE-GSC-12770-1; US-PATENT-4,393,039;
US-PATENT-APPL-SN-301075; US-PATENT-CLASS-423-648R;
US-PATENT-CLASS-423-649) Avail: US Patent and Trademark Office CSCL 07D

The cooling capacity of a solid hydrogen cooling system is significantly increased by exposing vapor created during evaporation of a solid hydrogen mass to a catalyst and thereby accelerating the endothermic para-to-ortho transition of the vapor to equilibrium hydrogen. Catalyst such as nickel, copper, iron or metal hydride gels of films in a low pressure drop catalytic reactor are suitable for accelerating the endothermic para-to-ortho conversion.

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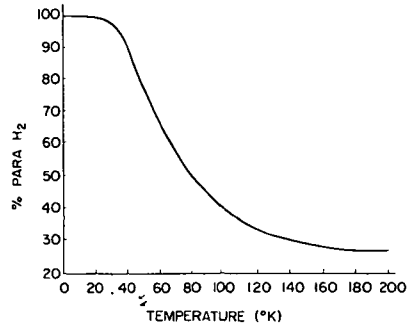
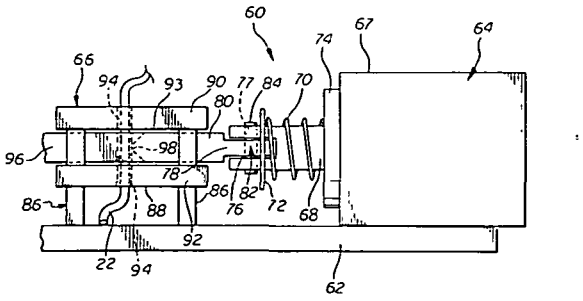



**N83-29325*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**A SPILLAGE DETECTOR FOR LIQUID CHROMATOGRAPHY SYSTEMS Patent Application**
M. R. JARVIS (Illinois Univ.) and D. S. FULTON, inventors (to NASA) (Illinois Univ.) 23 Mar. 1983 27 p
(Contract NAS9-15328)
(NASA-CASE-MSC-20206-1; US-PATENT-APPL-SN-478129)
Avail: NTIS HC A03/MF A01 CSCL 07D

A spillage detector device for use in conjunction with fractionation of liquid chromatography systems which includes a spillage receiving enclosure beneath the fractionation area is described. A sensing device having a plurality of electrodes of alternating polarity is mounted within the spillage receiving enclosure. Detection circuitry, responsive to conductivity between electrodes, is operatively connected to the sensing device. The detection circuitry feeds into the output circuitry. The output circuit has relaying and switching circuitry directed to a solenoid, and alarm system, and a pump. The solenoid is connected to the

pliable conduit of the chromatography system. The alarm system comprises an audio alarm and a visual signal. A 115 volt power system is interconnected with the pump, the solenoid, the sensing device, and the detection and output circuitry (38). NASA



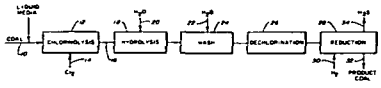

**N83-31743*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**HYDRODESULFURIZATION OF CHLORINIZED COAL Patent**

J. J. KALVINSKAS (JPL, California Inst. of Tech., Pasadena) and N. K. ROHATGI, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 5 Jul. 1983 10 p Filed 30 Oct. 1981 Supersedes N82-12240 (20 - 03, p 0318) Sponsored by NASA
(NASA-CASE-NPO-15304-1; US-PATENT-4,391,609; US-PATENT-APPL-SN-315587; US-PATENT-CLASS-44-1SR; US-PATENT-CLASS-201-17) Avail: US Patent and Trademark Office CSCL 07D

A method of desulfurization is described in which high sulfur coals are desulfurized by low temperature chlorinolysis of coal in liquid media, preferably water, followed by hydrodesulfurization at a temperature above 500 C. The coals are desulfurized to an extent of up to 90% by weight and simultaneously dechlorinated to a chlorine content below 0.1% by weight. The product coals have lower volatiles loss, lower oxygen and nitrogen content and higher fixed carbon than raw coals treated with hydrogen under the same conditions. Heating the chlorinated coal to a temperature above 500 C. in inert gas such as nitrogen results in significantly less desulfurization.

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



**N83-33977*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SYNTHESIS OF DAWSONITES Patent**

R. L. ALTMAN, inventor (to NASA) 26 Oct. 1982 3 p Filed 14 Aug. 1980 Supersedes N80-31490 (18 - 22, p 2967)
(NASA-CASE-ARC-11326-1; US-PATENT-4, 356,157; US-PATENT-APPL-SN-178192; US-PATENT-CLASS-423-419P; US-PATENT-CLASS-252-5; US-PATENT-CLASS-423-600; US-PATENT-CLASS-424-156) Avail: US Patent and Trademark Office CSCL 07D

Alkali metal and ammonium dawsonites can be prepared by a nonaqueous process according to which equimolar quantities of the corresponding hydrogen carbonate and aluminum hydroxide in finely divided state are heated together to a tempeature within the range of 150 to 250 C, for a period of 1 to 6 hours under a carbon dioxide pressure within the range of 120 to 360 psig. Carbonates may be used instead of hydrogencarbonates.

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**N83-36118*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**FIRE EXTINGUISHANT MATERIALS Patent**

R. L. ALTMAN (San Jose State Univ., Calif.), L. A. MAYER (San Jose State Univ., Calif.), and A. C. LING, inventors (to NASA) (San Jose State Univ., Calif.) 27 Sep. 1983 3 p Filed 3 Nov. 1981 Supersedes N82-12168 (20 - 03, p 0308) Sponsored by NASA
(NASA-CASE-ARC-11252-1; US-PATENT-4,406,797; US-PATENT-APPL-SN-317977; US-PATENT-CLASS-252-5; US-PATENT-CLASS-169-47; US-PATENT-CLASS-252-2) Avail: US Patent and Trademark Office CSCL 07D

Fire extinguishant composition comprising a mixture of a finely divided aluminum compound and alkali metal, stannous or plumbous halide is provided. Aluminum compound may be aluminum hydroxide, alumina or boehmite but preferably it is an alkali metal dawsonite. The metal halide may be an alkali metal, e.g. potassium iodide, bromide or chloride or stannous or plumbous iodide, bromide or chloride. Potassium iodide is preferred.

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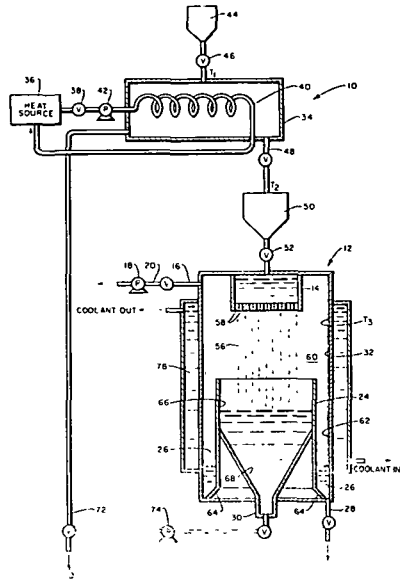
**N83-36119*#** National Aeronautics and Space Administration. Pasadena Office, Calif.

**TOWER EVAPORATOR Patent Application**

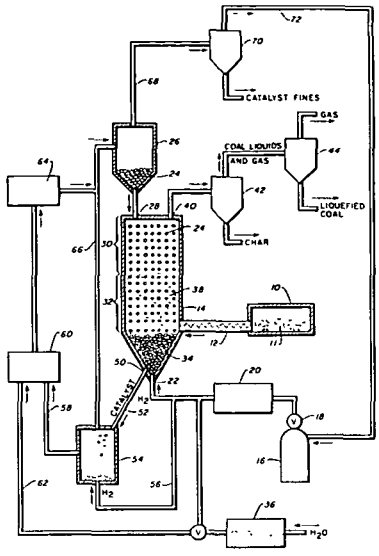
E. R. DUFRESNE, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 19 Apr. 1983 20 p
(Contract NAS7-100)
(NASA-CASE-NPO-15609-1; US-PATENT-APPL-SN-511363)
Avail: NTIS HC A02/MF A01 CSCL 07D

Liquids, such as juices, milk, molten metal and the like are concentrated by forming uniformly sized, small droplets in a precision droplet forming assembly. The droplets are displayed in free fall downwardly as a central column within an evacuated tower with cool walls. A portion of the solvent evaporates. The vapor flows to the wall, condenses, and usually flows down the wall as a film to condensate collector and drain. (In special cases, the condensate may be frozen on the wall, and stripped from it

as a solid.) The vertical column of freely falling droplets enters the splash guard. The condensate can be collected, sent to other towers or recycled. NASA




to form vapors which rise and are hydrocracked and refined to the upper zone before being swept out the outlet by the hot carrier gas. NASA




**N83-36120*#** National Aeronautics and Space Administration. Pasadena Office, Calif.

**FLUIDIZED BED COAL LIQUEFACTION Patent Application**

S. A. QADER, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 30 Jun. 1983 24 p

(Contract NAS7-100)

(NASA-CASE-NPO-15891-1; US-PATENT-APPL-SN-526740)

Avail: NTIS HC A02/MF A01 CSCL 07D

Coal is catalytically hydropyrolyzed at temperatures of 500 C to 700 C and pressures of 1000 psi to 4000 psi to form a liquefied product comprising gasoline and middle distillate fuel and diesel oils by forming a fluidized bed of coal in hot hydrogen or hydrogen steam gas fed into the bottom inlet of a reactor. Catalyst particles shower downwardly through the upper hydrorefining zone and lower liquefaction zone and are collected in an engager before recycle. As the catalyst particles contact the coal particles within the liquefaction zone in the presence of hydrogen, the coal dissolves

**N83-36121*#** National Aeronautics and Space Administration. Pasadena Office, Calif.

**FLUIDIZED BED LIQUEFACTION OF BIOMASS Patent Application**

S. A. QADER, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Aug. 1983 25 p

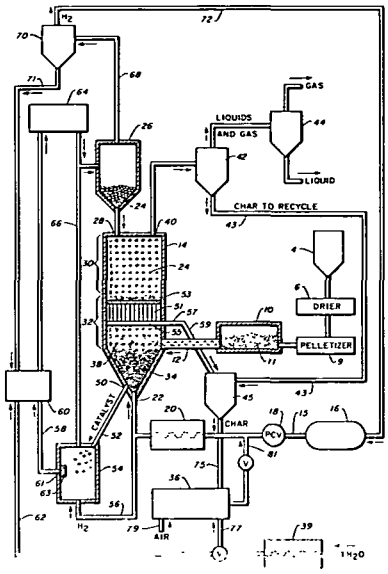
(Contract NAS7-100)

(NASA-CASE-NPO-15907-1; US-PATENT-APPL-SN-526832)

Avail: NTIS HC A02/MF A01 CSCL 07D

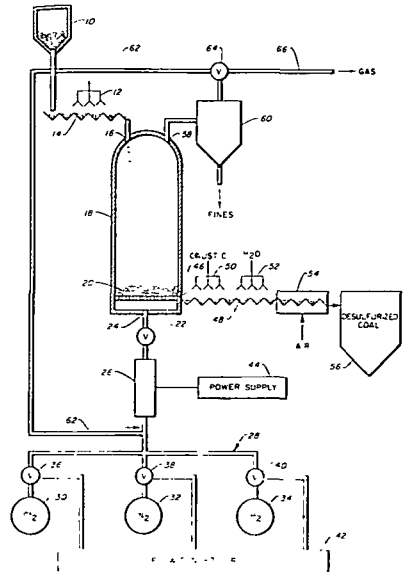
Biomass particles are dried and pelletized. The pellets are catalytically hydropyrolyzed at temperatures of 500 C to 700 C and pressures of 1000 psi to form a liquefied product comprizing gasoline and middle distillate fuel and diesel oils. The pellets form a fluidized bed of biomass in hot hydrogen or hydrogen synthesis gas fed into the bottom inlet of a reactor. Catalyst particles shower downwardly through the upper hydrorefining zone and lower liquefaction zone and are collected before recycle. As the catalyst particles contact the biomass particles within the

liquefaction zone in the presence of hydrogen, the biomass dissolves to form vapors which rise and are hydrocracked and refined in the upper zone. NASA




**N83-36122*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**FLUIDIZED BED DESULFURIZATION Patent Application**
M. RAVINDRAM (JPL, California Inst. of Tech., Pasadena) and J. J. KALVINSKAS, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 30 Jun. 1983 44 p
(Contract NAS7-100)
(NASA-CASE-NPO-15924-1; US-PATENT-APPL-SN-526768)
Avail: NTIS HC A03/MF A01 CSCL 07D

High sulfur content carbonaceous material, such as coal, is desulfurized by continuous fluidized suspension in a reactor with chlorine gas, inert dechlorinating gas, and hydrogen gas. A source of chlorine gas, a source of inert gas and a source of hydrogen gas are connected to the bottom inlet through a manifold and a heater. A flow controller operates servos in a manner to continuously and sequentially suspend coal in the three gases. The sulfur content is reduced at least 50% by the treatment. NASA

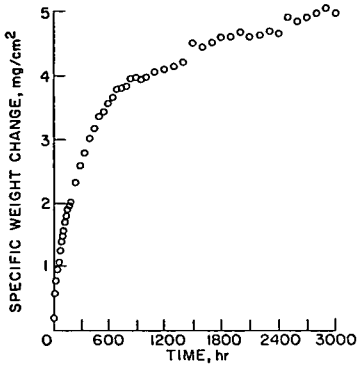



# 26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

**N83-24639*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**IMPROVED NICKEL BASE COATING ALLOY Patent Application**
C. A. BARRETT and C. E. LOWELL, inventors (to NASA) 23 Mar. 1983 7 p
(NASA-CASE-LEW-13834-1; US-PATENT-APPL-SN-478131)
Avail: NTIS HC A02/MF A01 CSCL 11F

Zirconium is added to a Ni-30 Al (beta) intermetallic alloy in the range of 0.05 w/o to 0.25 w/o. This addition is made during melting or by using metal powders. The addition of zirconium improves the cyclic oxidation resistance of the alloys at temperatures above 1100 C. NASA




**N83-31795*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**SILICON-SLURRY/ALUMINIDE COATING Patent**
D. L. DEADMORE and S. G. YOUNG, inventors (to NASA) 15 Feb. 1983 6 p Filed 14 Aug. 1981
(NASA-CASE-LEW-13343; US-PATENT-4,374,183;
US-PATENT-APPL-SN-293418; US-PATENT-CLASS-428-641;
US-PATENT-CLASS-428-650; US-PATENT-CLASS-428-680;
US-PATENT-CLASS-428-450; US-PATENT-CLASS-428-469;
US-PATENT-CLASS-427-318; US-PATENT-CLASS-427-419.2)
Avail: US Patent and Trademark Office CSCL 11F

A low cost coating protects metallic base system substrates from high temperatures, high gas velocity ovidation, thermal fatigue and hot corrosion and is particularly useful fo protecting vanes and blades in aircraft and land based gas turbine engines. A lacquer slurry comprising cellulose nitrate containing high purity silicon powder is sprayed onto the superalloy substrates. The silicon layer is then aluminized to complete the coating. The Si-Al coating is less costly to produce than advanced aluminides and protects the substrates from oxidation and thermal fatigue for a much longer period of time than the conventional aluminide coatings. While more expensive Pt-Al coatings and physical vapor deposited MCrAlY coatings may last longer or provide equal protection on certain substrates, the Si-Al coating exceeded the performance of

both types of coatings on certain superalloys in high gas velocity oxidation and thermal fatigue and increased the resistance of certain superalloys to hot corrosion.
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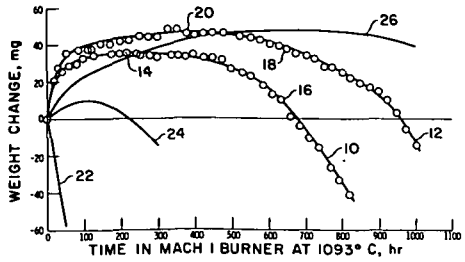


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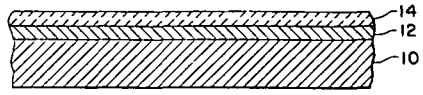
**N83-34014*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**IMPROVED THERMAL BARRIER COATING SYSTEM Patent Application**
S. STECKRA, inventor (to NASA) 16 Aug. 1983 12 p
(NASA-CASE-LEW-13324-2; US-PATENT-APPL-SN-523297)
Avail: NTIS HC A02/MF A01 CSCL 11F

A high temperature oxidation resistant thermal barrier coating system for a nickel, cobalt, or iron base alloy substrate is described. An inner metal bond coating contacts the substrate, and a thermal barrier coating covers the bond coating. NiCrAlR, FeCrAlR, and CoCrAlR alloys were satisfactory as bond coating compositions where R = Y or Yb. These alloys contain, by weight, 24.9 to 36.7% chromium, 5.4 to 18.5% aluminum, and 0.05 to 1.55% yttrium or 0.05 to 0.53% ytterbium. The coatings containing ytterbium are preferred over those containing yttrium. An outer thermal barrier coating of partially stabilized zirconium oxide (zirconia) which is between 6% and 8%, by weight, of yttrium oxide (yttria) covers the bond coating. Partial stabilization provides a material with superior durability. NASA

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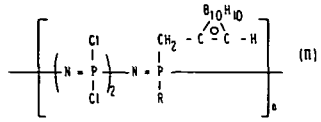
# 27 NONMETALLIC MATERIALS

**Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.**

**N83-25884*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**CARBORANYLMETHYLENE-SUBSTITUTED PHOSPHAZENES, POLYMERS THEREOF AND PROCESS FOR THE PRODUCTION THEREOF Patent Applications**
H. R. ALLCOCK (Pennsylvania State Univ., Univ. Park) and A. G. SCOPELIANOS, inventors (to NASA) (Pennsylvania State Univ., Univ. Park) 3 May 1983 19 p Sponsored by NASA
(NASA-CASE-ARC-11370-1; US-PATENT-APPL-SN-491125)
Avail: NTIS HC A02/MF A01 CSCL 11G

Carboranylmethylene-substituted cyclophosphazenes which can be thermally polymerized into carboranylmethylene-substituted phosphazene polymers are useful as thermally stable coatings. Due to the characteristics of these polymers in acting as a ligand for transition metals, metallocarboranyl methylene phosphazene polymers can act as immobilized catalyst systems, and are electrically conductive and superconductive. NASA

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**N83-28240*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ELASTOMER TOUGHENED POLYIMIDE ADHESIVES Patent**
A. K. ST.CLAIR and T. L. ST.CLAIR, inventors (to NASA) 21 Jun. 1983 6 p Filed 2 Oct. 1981 Supersedes N82-25384 (20 - 16, p 2221)
(NASA-CASE-LAR-12775-1; US-PATENT-4,389,504;
US-PATENT-APPL-SN-308201; US-PATENT-CLASS-524-233;
US-PATENT-CLASS-524-726; US-PATENT-CLASS-524-104;
US-PATENT-CLASS-524-173; US-PATENT-CLASS-525-181;
US-PATENT-CLASS-525-183; US-PATENT-CLASS-525-184;
US-PATENT-CLASS-525-474) Avail: US Patent and Trademark Office CSCL 11C

A rubber-toughened addition-type polyimide composition is disclosed which has excellent high temperature bonding characteristics in the fully cured state, and improved peel strength and adhesive fracture resistance physical property characteristics. The process for making the improved adhesive involves preparing the rubber containing amic acid prepolymer by chemically reacting an amine-terminated elastomer and an aromatic diamine with an aromatic dianhydride with which a reactive chain stopper anhydride was mixed, and utilizing solvent or mixture of solvents for the reaction. Official Gazette of the U.S. Patent and Trademark

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**N83-29388*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**METHOD OF FORMING OXIDE COATINGS Patent**
G. E. MCDONALD, inventor (to NASA) 12 Jul. 1983 3 p Filed 10 Jun. 1981 Supersedes N81-27616 (19 - 18, p 2509)
(NASA-CASE-LEW-13132-1; US-PATENT-4,392,920;
US-PATENT-APPL-SN-272152; US-PATENT-CLASS-204-37R;
US-PATENT-CLASS-204-35N; US-PATENT-CLASS-204-56R)
Avail: US Patent and Trademark Office CSCL 11D

This invention is concerned with an improved plating process for covering a substrate with a black metal oxide film. The invention is particularly directed to making a heating panel for a solar collector. A compound is electrodeposited from an aqueous solution containing cobalt metal salts onto a metal substrate. This compound is converted during plating into a black, highly absorbing oxide coating which contains hydrated oxides. This is achieved by the inclusion of an oxidizing agent in the plating bath. The inclusion of an oxidizing agent in the plating bath is contrary to standard electroplating practice. The hydrated oxides are converted to oxides by treatment in a hot bath, such as boiling water. An oxidizing agent may be added to the hot liquid treating bath.
Official Gazette of the U.S. Patent and Trademark Office

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**N83-29390*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ELASTOMER TOUGHENED POLYIMIDE ADHESIVES Patent Application**
A. K. ST.CLAIR and T. L. ST.CLAIR, inventors (to NASA) 28 Jan. 1983 14 p
(NASA-CASE-LAR-12775; US-PATENT-APPL-SN-461788) Avail: NTIS HC A02/MF A01 CSCL 11A

A rubber toughened addition type polyimide composition having excellent high temperature bonding characteristics in the fully cured state and improved peel strength and adhesive fracture resistance physical property characteristics is disclosed. The process for making the improved adhesive involves preparing the rubber containing amic acid prepolymer by chemically reacting an amine terminated elastomer and an aromatic diamine with an aromatic dianhydride with which a reactive chain stopper anhydride was mixed, and utilizing solvent or mixture of solvents for the reaction. NASA

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**N83-29391*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**A SOLVENT RESISTANT, THERMOPLASTIC AROMATIC POLY(IMIDESULFONE) AND PROCESS FOR PREPARING SAME Patent Application**
D. A. YAMAKI and T. L. ST.CLAIR, inventors (to NASA) 6 May 1983 12 p
(NASA-CASE-LAR-12858-2; US-PATENT-APPL-SN-492282)
Avail: NTIS HC A02/MF A01 CSCL 11I

A process for preparing a thermoplastic poly(imidesulfone) is disclosed. This resulting material has thermoplastic properties which are generally associated with polysulfones but not polyimides, and solvent resistance which is generally associated with polyimides but not polysulfones. This system is processable in the 250 to 350 C range for molding, adhesive and laminating applications. This unique thermoplastic poly(imidesulfone) is obtained by incorporating an aromatic sulfone moiety into the backbone of an aromatic linear polyimide by dissolving a quantity of a 3,3 prime, 4,4 prime-benzophenone tetracarboxylic dianhydride (BTDA) in a solution of 3,3 prime-diamino diphenylsulfone and bis(2-methoxyethyl)ether, precipitating the reactant product in water, filtering and drying the recovered poly(amide-acid sulfone) and converting it to the poly(imidesulfone) by heating. NASA

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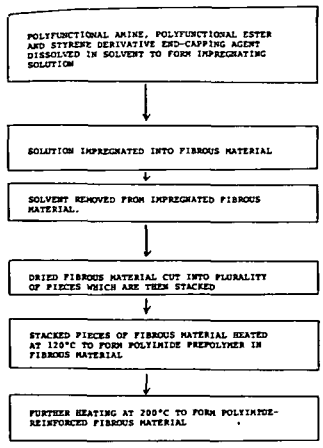
**N83-29392*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**LOW TEMPERATURE CROSS LINKING POLYIMIDES Patent Application**
T. T. SERAFINI and P. DELVIGS, inventors (to NASA) 30 Jun. 1982 14 p
(NASA-CASE-LEW-12876-2; US-PATENT-APPL-SN-393583)
Avail: NTIS HC A02/MF A01 CSCL 11I

A polyimide is formed by cross linking a prepolymer formed by reacting a polyfunctional ester, a polyfunctional amine, and an end-capping unit. By providing an end-capping unit, the prepolymer is curable at a relatively low temperature of about 175 to 245 C. NASA

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**N83-30651*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**CHEMICAL APPROACH FOR CONTROLLING NADAMIDE CURE TEMPERATURE AND RATE Patent Application**
R. W. LAUVER, inventor (to NASA) 22 Jul. 1983 19 p
(NASA-CASE-LEW-13770-2; US-PATENT-APPL-SN-516217)
Avail: NTIS HC A02/MF A01 CSCL 11G

Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 C by controlling the available concentration of the maleic end-capped reactant. This control can be achieved by adding sufficient amounts of said maleic reactant, or by chemical modification of either copolymer, so as to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or holding initiation and polymerization to a rate compatible with the availability of the maleic-capped reactant. NASA

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**N83-31854*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**PHOSPHORUS-CONTAINING IMIDE RESINS Patent**
I. K. VARMA (National Academy of Sciences-National Research Council, Washington, D.C.), G. M. FOHLEN, and J. A. PARKER, inventors (to NASA) 26 Jul. 1983 6 p Filed 30 Jul. 1981 Supersedes N81-031314 (19 - 22, p 3042)
(NASA-CASE-ARC-11368-1; US-PATENT-4,395,557; US-PATENT-APPL-SN-288267; US-PATENT-CLASS-548-413; US-PATENT-CLASS-548-415) Avail: US Patent and Trademark Office CSCL 11G

Bis- and tris-imides derived from tris (m-aminophenyl) phosphine oxides by reaction with maleic anhydride or its derivatives, and addition polymers of such imides, including a variant in which a mono-imide is condensed with a dianhydride and the product is treated with a further quantity of maleic anhydride. Such monomers or their oligomes may be used to impregnate fibers and fabrics which when cured, are flame resistant. Also an improved method of producing tris (m-aminophenyl) phosphine oxides from the nitro analogues by reduction with hydrazine hydrate using palladized charcoal or Raney nickel as the catalyst is described.
Official Gazette of the U. S. Patent and Trademark Office

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**N83-31855*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**THERMAL BARRIER COATING SYSTEM HAVING IMPROVED ADHESION Patent**
R. C. BILL and J. S. SOVEY, inventors (to NASA) 15 Jun. 1982 3 p Filed 28 Jan. 1981 Supersedes N81-24265 (19 - 15, p 2038)
(NASA-CASE-LEW-1335901; US-PATENT-4,335,190; US-PATENT-APPL-SN-229233; US-PATENT-CLASS-428-623; US-PATENT-CLASS-428-633; US-PATENT-CLASS-428-678; US-PATENT-CLASS-427-34; US-PATENT-CLASS-427-405; US-PATENT-CLASS-427-219.2; US-PATENT-CLASS-427-423)
Avail: US Patent and Trademark Office CSCL 11A

The adherence between a ceramic thermal barrier coating and a metal bond coating is improved by ion sputtering a ceramic film on the bond cost. A ceramic thermal barrier coating is then plasma-sprayed onto this primer film. This improves the integrity and strength of the interface between the plasma-sprayed ceramic layer and metallic bond coat which insures stronger adherence between the metal and the ceramic.

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**N83-34039*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**METHOD OF NEUTRALIZING THE CORROSIVE SURFACE OF AMINE-CURED EPOXY RESINS Patent**
S. Y. LEE, inventor (to NASA) 7 Dec. 1982 3 p Filed 14 Aug. 1981 Supersedes N82-10227 (20 - 01, p 0035)
(NASA-CASE-GSC-12686-1; US-PATENT-4,362,769; US-PATENT-APPL-SN-293412; US-PATENT-CLASS-427-322; US-PATENT-CLASS-427-340; US-PATENT-CLASS-427-352; US-PATENT-CLASS-427-400; US-PATENT-CLASS-427-407.1)
*Avail: US Patent and Trademark Office CSCL 11G*

The corrosive alkaline surface layer of an epoxy resin product formed by the curing of the epoxy with an aliphatic amine is eliminated by first applying a non-solvent to remove most or all of the free unreacted amine and then applying a layer of a chemical reagent to neutralize the unused amine or amine functional groups by forming a substituted urea. The surface then may be rinsed with acetone and then with alcohol. The non-solvent may be an alcohol. The neutralizing chemical reagent is a mono-isocyanate or a mono-isothiocyanate. Preferred is an aromatic mono-isocyanate such as phenyl isocyanate, nitrophenyl isocyanate and naplthyl isocyanate.

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**N83-34040*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**POLYPHENYLQUINOXALINES CONTAINING PENDANT PHENYLETHYNYL AND ETHYNYL GROUPS Patent**
P. M. HERGENROTHER, inventor (to NASA) (Virginia Polytechnic Inst. and State Univ.) 1 Mar. 1983 11 p Filed 12 Nov. 1981 Supersedes N82-26463 (20 - 17, p 2381) Sponsored by NASA
(NASA-CASE-LAR-12838-1; US-PATENT-4,375,536; US-PATENT-APPL-SN-320621; US-PATENT-CLASS-528-125; US-PATENT-CLASS-526-259; US-PATENT-CLASS-526-285; US-PATENT-CLASS-528-12; US-PATENT-CLASS-528-38; US-PATENT-CLASS-528-126; US-PATENT-CLASS-528-128; US-PATENT-CLASS-528-220; US-PATENT-CLASS-528-222; US-PATENT-CLASS-528-228; US-PATENT-CLASS-528-229)
Avail: US Patent and Trademark Office CSCL 11C

Poly(phenylquinoxaline) prepolymers containing pendant phenylethynyl and ethynyl groups are disclosed along with the process for forming these polymers. Monomers and the process for producing same that are employed to prepare the polymers are also disclosed.

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

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**N83-34041*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**SOLVENT RESISTANT THERMOPLASTIC AROMATIC POLY(IMIDESULFONE) AND PROCESS FOR PREPARING SAME Patent**
T. L. ST.CLAIR and D. A. YAMAKI, inventors (to NASA) 9 Aug. 1983 4 p Filed 11 Aug. 1982 Supersedes N83-13259 (21 - 04, p 0497)
(NASA-CASE-LAR-12858-1; US-PATENT-4,398,021; US-PATENT-APPL-SN-407240; US-PATENT-CLASS-528-222; US-PATENT-CLASS-264-137; US-PATENT-CLASS-264-258; US-PATENT-CLASS-164-331.12; US-PATENT-CLASS-264-331.46; US-PATENT-CLASS-528-226) Avail: US Patent and Trademark Office CSCL 11G

A process for preparing a thermoplastic poly(imidesulfone) is disclosed. This resulting material has thermoplastic properties which are generally associated with polysulfones but not polyimides, and solvent resistance which is generally associated with polyimides but not polysulfones. This system is pocessable in the 250 to 350 C range for molding, adhesive and laminating applications. This unique thermoplastic poly(imidesulfone) is obtained by incorporating an aromatic sulfone moiety into the backbone of an aromatic linear polyimide by dissolving a quantity of a 3,3',4,4'-benzophenonetetracarboxylic dianhydride (BTDA) in a solution of 3,3'-diaminodiphenylsulfone and bis(2-methoxyethyl)ether, precipitating the reactant product in water, filtering and drying the recovered poly(amide-acid sulfone) and converting it to the poly(imidesulfone) by heating.

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**N83-34043*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**ANTENNA GROUT REPLACEMENT SYSTEM Patent**
C. E. MCCLUNG, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Jul. 1983 6 p Filed 10 Feb. 1981 Supersedes N81-19457 (19 - 10, p 1354) Sponsored by NASA
(NASA-CASE-NPO-15202-1; US-PATENT-4,395,503; US-PATENT-APPL-SN-233271; US-PATENT-CLASS-523-440; US-PATENT-CLASS-523-443; US-PATENT-CLASS-384-124)
Avail: US Patent and Trademark Office CSCL 11G

An epoxy grout suitable for use in mounting and positioning bearing runner plates used in hydrostatic bearing assemblies for rotatably mounting large radio telescope structures to stationary support pedestals is described. The epoxy grout may be used in original mountings or may be used as part of a replacement system for repairing cavities in existing grout resulting from grout deterioration. The epoxy grout has a relatively short work life and cure time even in the presence of hydraulic oil. The epoxy grout cures without shrinking or sagging to form a grout which is sufficiently strong and durable to provide a grout especially well suited for use under the high pressure loading and close tolerance requirements of large hydrostatic bearing assemblies.

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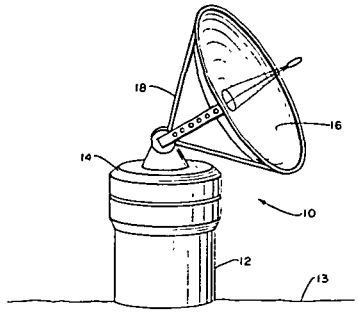
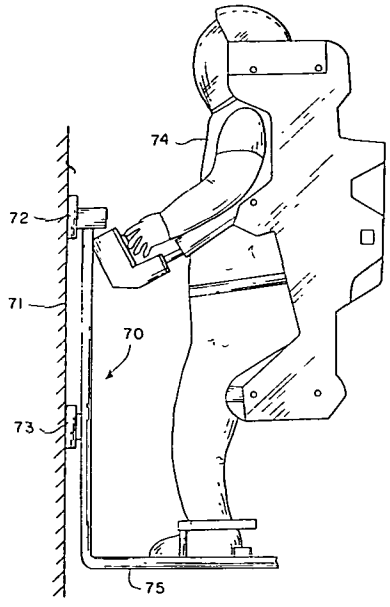


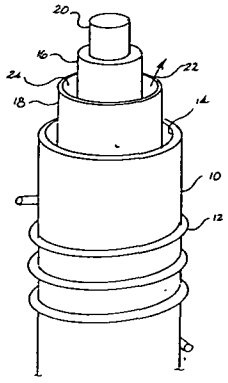
**N83-34044*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**HOT MELT ADHESIVE ATTACHMENT PAD Patent Application**
R. L. FOX, A. W. FRIZZILL, B. D. LITTLE, D. J. PROGAR, R. H. COULTRIP, R. H. COUCH, J. R. GLEASON, B. A. STEIN, J. D. BUCKLEY, inventors (to NASA), and T. L. ST.CLAIR 22 Jul. 1983 14 p
(NASA-CASE-LAR-12894-1; US-PATENT-APPL-SN-516087)
Avail: NTIS HC A02/MF A01 CSCL 11A

The invention relates to a hot melt adhesive attachment pad for releasably securing distinct elements together and particularly useful in the construction industry or a spatial vacuum environment. The attachment pad consists primarily of a cloth selectively impregnated with a charge of hot melt adhesive, a thermofoil heater and a thermocooler. These components are security mounted in a mounting assembly. In operation, the operator activates the heating cycle transforming the hot melt adhesive to a substantially liquid state, positions the pad against the attachment surface, and activates the cooling cycle solidifying the adhesive and forming a strong, releasable bond. NASA




**N83-36220*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**APPARATUS AND METHOD FOR HEATING A MATERIAL IN A TRANSPARENT AMPOULE Patent**
L. R. HOLLAND, inventor (to NASA) (Athens State Coll., Ala.) 11 Oct. 1983 8 p Filed 30 Jun. 1981 Supersedes N81-30012 (19 - 20, p 2851) Sponsored by NASA
(NASA-CASE-MFS-25436-1; US-PATENT-4,408,658; US-PATENT-APPL-SN-280151; US-PATENT-CLASS-165-2; US-PATENT-CLASS-165-58; US-PATENT-CLASS-219-354; US-PATENT-CLASS-219-390; US-PATENT-CLASS-219-343; US-PATENT-CLASS-219-411; US-PATENT-CLASS-156-600; US-PATENT-CLASS-156-610; US-PATENT-CLASS-156-DIG.73; US-PATENT-CLASS-156-DIG.89; US-PATENT-CLASS-350-316)
Avail: US Patent and Trademark Office CSCL 11G

An improved process for heating a material within a fused silica ampoule by radiation through the wall of the ampoule, while simultaneously passing a cooling gas around the ampoule is described. The radiation passes through a screen of fused silica so as to remove those components capable of directly heating the silica, therby increasing the temperature of the material within the ampoule above the strain point of the ampoule, while maintaining the exterior of the ampoule cool enough to prevent rupturing the amp.
Official Gazette of the U.S. Patent and Trademark Office



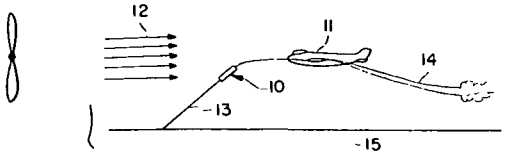

# 28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

**N83-35158*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**CONTINUOUS LAMINAR SMOKE GENERATOR Patent Application**
L. M. WEINSTEIN, inventor (to NASA) 30 Aug. 1983 11 p
(NASA-CASE-LAR-13014-1; US-PATENT-APPL-SN-527918)
Avail: NTIS HC A02/MF A01 CSCL 19A

A smoke generator is disclosed which is capable of emitting a very thin, laminar stream of smoke for use in high detail flow visualization as well as a larger but less stable "rope" of smoke. The invention consists of a pressure supply, and a fluid supply, which supply a smoke generating fluid to a feed tube. The feed tube is directly heated by electrical resistance from a current supplied by power supply and is regulated by constant temperature controller. A smoke exit hole is drilled in the wall of feed tube. Because the feed tube is heated both before and past the exit hole, no condensation of smoke generating fluid occurs at the smoke exit hole, enabling the production of a very stable smoke filament. The generator is small in size, thereby avoiding wind turbulence in front of the test model. NASA

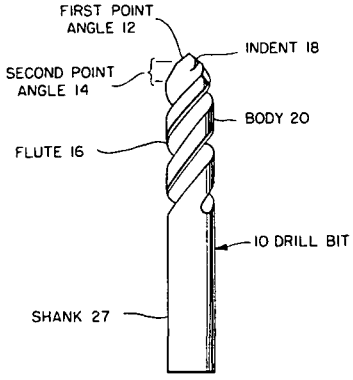


# 31 ENGINEERING (GENERAL)

**Includes vacuum technology; control engineering; display engineering; and cryogenics.**

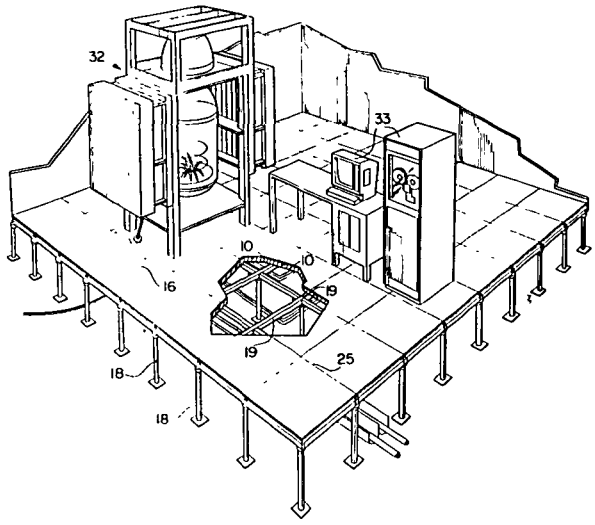
**N83-27058*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**METHOD FOR MILLING AND DRILLING GLASS Patent**
S. H. RICE, inventor (to NASA) 30 Jul. 1980 5 p Filed 30 Jul. 1980 Supersedes N80-29705 (18 - 20, p 2709)
(NASA-CASE-GSC-12636-1; US-PATENT-4,383,785; US-PATENT-APPL-SN-173520; US-PATENT-CLASS-409-131; US-PATENT-CLASS-125-20; US-PATENT-CLASS-408-1R; US-PATENT-CLASS-408-61) Avail: US Patent and Trademark Office CSCL 13H

A process for machining glass by placing a rotating carbide working surface under minimum pressure against an area of glass to be worked is described. Concurrently the region between the working surface and the area of glass is wet with a lubricant consisting essentially of a petroleum carrier, a complex mixture of esters and a complex mixture of naturally occurring aromatic oils.
Official Gazette of the U.S. Patent and Trademark Office



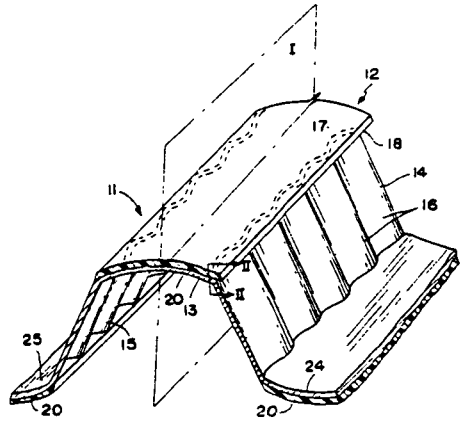

**N83-28281*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**ELEVATED WATERPROOF ACCESS FLOOR SYSTEM AND METHOD OF MAKING THE SAME Patent Application**
M. M. COHEN, inventor (to NASA) 1 Jun. 1983 15 p
(NASA-CASE-ARC-11363-1; US-PATENT-APPL-SN-500046)
Avail: NTIS HC A02/MF A01 CSCL 13B

An elevated waterproof access floor system having subfloor channels or compartments for power lines, gas lines or the like is adapted such that it can be opened and subsequently resealed without destroying the waterproofing and without destroying its aesthetic appearance. A multiplicity of tiles are supported on a support grid, and a flooring sheet is supported on the tiles. Attachment means are provided to prevent lateral but not vertical movement of the flooring sheet with respect to the tiles so that the flooring sheet can be lifted off the tiles, but when the flooring sheet is supported on the tiles, no lateral slipping will occur. The flooring sheet is made of a heat resealable material, so that it can be cut away in sections, and the tiles therebelow lifted off, to provide access to subfloor compartments. NASA




**N83-29446*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**CURVED CAP CORRUGATED SHEET Patent Application**
R. C. DAVIS, T. T. BALES, D. M. K. ROYSTER, and L. R. JACKSON, inventors (to NASA) 1 Jul. 1983 15 p
(NASA-CASE-LAR-12884-1; US-PATENT-APPL-SN-510136)
Avail: NTIS HC A02/MF A01 CSCL 13B

The invention is a structure for a strong, lightweight corrugated sheet. The sheet is planar or curved and includes a plurality of corrugation segments, each segment being comprised of a generally U-shaped corrugation with a part-cylindrical crown and cap strip, and straight slide walls with secondary corrugations oriented at right angles to said side walls. The cap strip is bonded to the crown and the longitudinal edge of said cap strip extends beyond edge at the intersection between said crown and said side walls. The high strength relative to weight of the structure makes it desirable for use in aircraft or spacecraft. NASA



**N83-31895*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**BEAM CONNECTOR APPARATUS AND ASSEMBLY Patent**
G. F. VONTIESENHAUSEN, inventor (to NASA) 3 May 1983 6 p Filed 8 Oct. 1980 Supersedes A81-12283 (19 - 03, p 0332)
(NASA-CASE-MFS-25134-1; US-PATENT-4,381,583; US-PATENT-APPL-SN-195226; US-PATENT-CLASS-24-214; US-PATENT-CLASS-244-159) Avail: US Patent and Trademark Office CSCL 13I

An apparatus and assembly for connecting beams and like structural members is disclosed which is particularly advantageous for connecting two members which are moved laterally into place. The connector apparatus requires no relative longitudinal movement between the ends of the beams or members being connected to make a connection joint. The apparatus includes a receptacle member and a connector housing carried by opposed ends of the structural member being connected. A spring-loaded connector member is carried by the connector housing which may be released for extension and engagement into the receptacle member.

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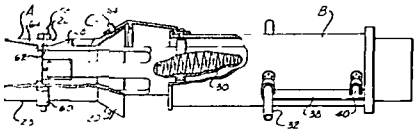

**N83-31896*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**METHOD AND APPARATUS FOR PRODUCING GAS-FILLED HOLLOW SPHERES Patent**
T. G. WANG (JPL, Calif. Inst. of Tech., Pasadena) and D. D. ELLEMAN, inventors (to NASA) (JPL, Calif. Inst. of Tech., Pasadena) 17 Aug. 1982 4 p Filed 18 Sep. 1981 Supersedes N82-26461 (20 - 17, p 2381)
(NASA-CASE-NPO-14596-3; US-PATENT-4,344,787; US-PATENT-APPL-SN-303671; US-PATENT-CLASS-65-214; US-PATENT-CLASS-65-22; US-PATENT-CLASS-65-142; US-PATENT-CLASS-264-5; US-PATENT-CLASS-264-9; US-PATENT-CLASS-425-6) Avail: US Patent and Trademark Office CSCL 13H

A system for forming hollow spheres containing pressured gas is described which includes a cylinder device containing a molten solid material with a nozzle at its end. A second gas nozzle, lying slightly upstream from the tip of the first nozzle, is connected to a source that applies pressured filler gas that is to fill the hollow spheres. High pressure is applied to the molten metal, as by moving a piston within the cylinder device, to force the molten material out of the first nozzle. At the same time, pressured gas fills the center of the extruded hollow liquid pipe that breaks into hollow spheres. The environment outside the nozzles contains gas at a high pressure such as 100 atmospheres. Gas is supplied to the gas nozzle at a slightly higher pressure such as 101 atmospheres. The pressure applied to the molten material is at a still higher pressure such as 110 atmospheres.

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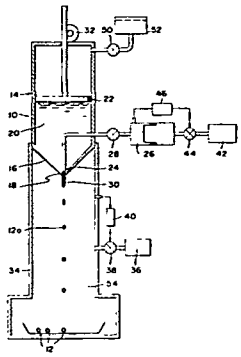
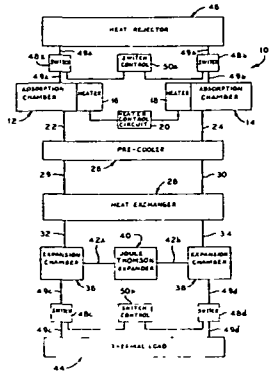


**N83-31897*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**CYCLING JOULE THOMSON REFRIGERATOR**
E. TWARD, inventor (to NASA) (JPL, Calif. Inst. of Tech., Pasadena) 4 Jan. 1983 8 p Filed 28 Jan. 1981 Supersedes N81-19344 (19 - 10, p 1338)
(NASA-CASE-NPO-15251-1; US-PATENT-4,366,680; US-PATENT-APPL-SN-229239; US-PATENT-CLASS-62-514R; US-PATENT-CLASS-62-48; US-PATENT-CLASS-337-14) Avail: US Patent and Trademark Office CSCL 14B

A symmetrical adsorption pump/compressor system having a pair of mirror image legs and a Joule Thomson expander, or valve, interposed between the legs thereof for providing a, efficient refrigeration cycle is described. The system further includes a plurality of gas operational heat switches adapted selectively to transfer heat from a thermal load and to transfer or discharge heat through a heat projector, such as a radiator or the like. The heat switches comprise heat pressurizable chambers adapted for alternate pressurization in response to adsorption and desorption of a pressurizing gas confined therein.

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



**N83-34073*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**METHOD OF TRACING CONTOUR PATTERNS FOR USE IN MAKING GRADUAL CONTOUR RESIN MATRIX COMPOSITES Patent**

M. J. FONTES, inventor (to NASA) 31 May 1983 7 p Filed 2 Apr. 1980 Supersedes N80-22410 (18 - 13, p 1680) (NASA-CASE-ARC-11246-1; US-PATENT-4,385,949; US-PATENT-APPL-SN-136660; US-PATENT-CLASS-156-59; US-PATENT-CLASS-156-264; US-PATENT-CLASS-156-344; US-PATENT-CLASS-273-240; US-PATENT-CLASS-434-88; US-PATENT-CLASS-434-403) Avail: US Patent and Trademark Office CSCL 13H

The invention relates to methods for making alminate patterns for a resin matrix composite structural component. A sheet of paper is temporarily adhered to a model of the structrual component. A pen is positioned on the paper with a spindle touching the model surface opposite the pen. The pen and spindle are moved along the path that maintains the aforementioned contacts. The resulting line traced on paper is a model constant-thickness locus and provides a pattern for a single lamination of resin-impregnated fabric. The steps are repeated to make other patterns and each time the steps are repeated the distance between the tracer and the spindle is changed to correspond to the thickness of a lamination.

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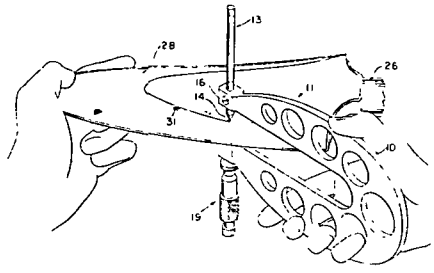

**N83-35176*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**SPHERE FORMING METHOD AND APPARATUS Patent**

C. L. YOUNGBERG (JPL, California Inst. of Tech., Pasadena), C. G. MILLER (JPL, California Inst. of Tech., Pasadena), J. B. STEPHENS (JPL, California Inst. of Tech., Pasadena), and A. A. FINNERTY, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 23 Aug. 1983 7 p Filed 30 Jul. 1982 Supersedes N82-33567 (20 - 24, p 3419) Sponsored by NASA (NASA-CASE-NPO-15070-1; US-PATENT-4,400,191; US-PATENT-APPL-SN-403847; US-PATENT-CLASS-65-21.4; US-PATENT-CLASS-65-21.3; US-PATENT-CLASS-65-22; US-PATENT-CLASS-65-142; US-PATENT-CLASS-264-5; US-PATENT-CLASS-264-12; US-PATENT-CLASS-264-24; US-PATENT-CLASS-425-6; US-PATENT-CLASS-425-7; US-PATENT-CLASS-425-10) Avail: US Patent and Trademark Office CSCL 13I

A system is provided for forming small accurately spherical objects. Preformed largely spherical objects are supported at the opening of a conduit on the update of hot gas emitted from the opening, so the object is in a molten state. The conduit is suddenly jerked away at a downward incline, to allow the molten object to drop in free fall, so that surface tension forms a precise sphere. The conduit portion that has the opening, lies in a moderate vacuum chamber, and the falling sphere passes through the chamber and through a briefly opened valve into a tall drop tower that contains a lower pressure, to allow the sphere to cool without deformation caused by falling through air.

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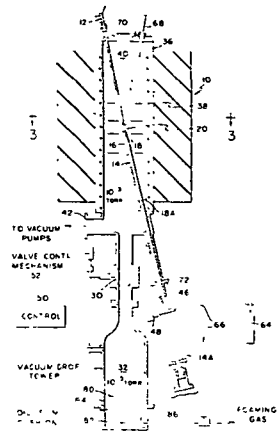

**N83-35177*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**COVERING SOLID, FILM COOLED SURFACES WITH A DUPLEX THERMAL BARRIER COATING Patent**

C. H. LIEBERT, inventor (to NASA) 6 Sep. 1983 4 p Filed 7 Dec. 1981 Supersedes N82-25463 (20 - 16, p 2232) (NASA-CASE-LEW-13450-1; US-PATENT-4,402,992; US-PATENT-APPL-SN-328760; US-PATENT-CLASS-427-34; US-PATENT-CLASS-427-243; US-PATENT-CLASS-427-247; US-PATENT-CLASS-427-423) Avail: US Patent and Trademark Office CSCL 13H

Thermal barrier coating systems were applied to hardware having passageways in the walls connecting apertures in the surface to a gas supply for film cooling. An inert gas, such as argon, is discharged through the apertures during the application of the thermal barrier coating system by plasma spraying. This flow of inert gas reduces both blocking of the holes and base metal oxidation during the coating operation.

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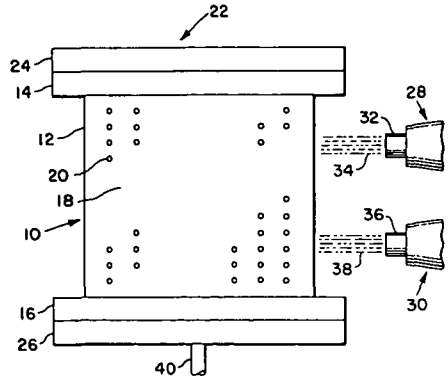
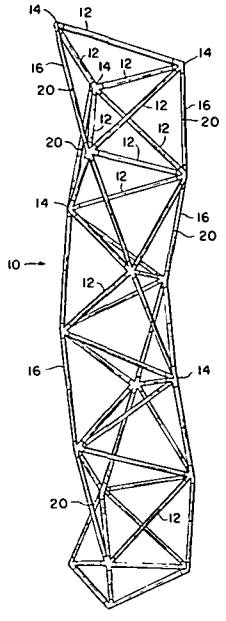


**N83-35178*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**SEQUENTIALLY DEPLOYABLE MANEUVERABLE TETRAHEDRAL BEAM Patent Application**
M. M. MIKULAS, JR. and R. F. CRAWFORD, inventors (to NASA) (General Research Corp., Santa Barbara, Calif.) 8 Sep. 1983 16 p
(NASA-CASE-LAR-13098-1; US-PATENT-APPL-SN-530339)
Avail: NTIS HC A02/MF A01 CSCL 13B

A tetrahedral beam that can be compactly stowed, sequentially deployed, and widely manipulated to provide a structurally sound yet highly maneuverable truss structure is comprised of a number of repeating units of tandem tetralhedral sharing common sides. Fixed length battens are joined into equilateral triangles called batten frames. Apexes of adjacent triangles are interconnected by longerons having mid-point folding hinges. Joints, comprised of gussets pivotably connected by links, permit two independent degrees of rotational freedom between joined adjacent batten frames, and provide a stable structure from packaged configuration to complete deployment. The longerons and joints can be actuated in any sequence, independently of one another. The beam is suited to remote actuation. Longerons may be provided with powered mid-point hinges enabling beam erection and packaging under remote control. Providing one or more longerons with powered telescoping segments permits the shape of the beam central axis to be remotely manipulated so that the beam may function as a remote manipulator arm. NASA




# 32 COMMUNICATIONS

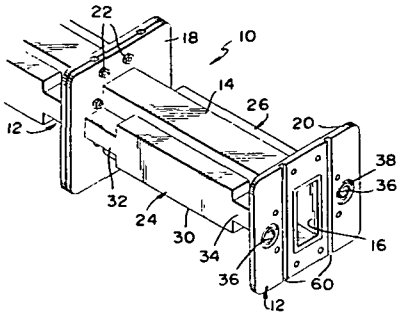
Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

**N83-27085*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**WAVEGUIDE COOLING SYSTEM Patent**
B. C. J. CHEN (JPL, California Inst. of Tech., Pasadena) and R. W. HARTOP, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 30 Apr. 1981 5 p Filed 30 Apr. 1981 Supersedes N81-29344 (19 - 20, p 2759) Sponsored by NASA
(NASA-CASE-NPO-15401-1; US-PATENT-4,382,239; US-PATENT-APPL-SN-259210; US-PATENT-CLASS-333-22F; US-PATENT-CLASS-333-254) Avail: US Patent and Trademark Office CSCL 20N

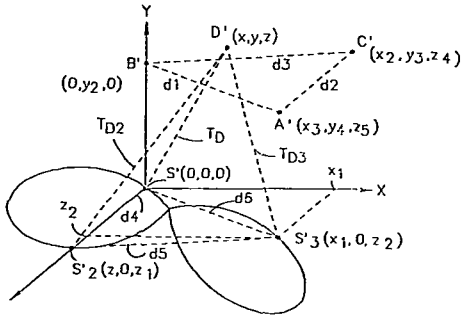
An improved system is described for cooling high power waveguides by the use of cooling ducts extending along the waveguide, which minimizes hot spots at the flanges where waveguide sections are connected together. The cooling duct extends along substantially the full length of the waveguide section, and each flange at the end of the section has a through hole with an inner end connected to the duct and an opposite end that can be aligned with a flange hole in another waveguide section. Earth flange is formed with a drainage groove in its face, between the through hole and the waveguide conduit to prevent leakage of cooling fluid into the waveguide. The ducts have narrowed sections immediately adjacent to the flanges to provide room for the installation of fasteners closely around the waveguide channel.

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



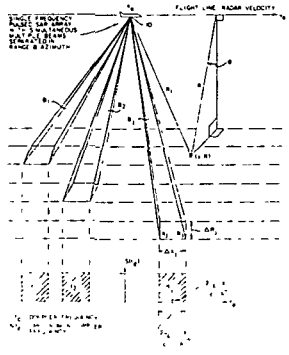

**N83-30832*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**METHOD FOR TERMINAL POSITION DETERMINATION IN EARTH TERMINAL-TO-SATELLITE BURST ACQUISITION AND SYNCHRONIZATION Patent Application**
R. E. HAY and D. J. SABOURIN, inventors (to NASA) 11 Jun. 1982 24 p
(NASA-CASE-LEW-13893-1; US-PATENT-APPL-SN-387622)
Avail: NTIS HC A02/MF A01 CSCL 17B

A method is presented for determining positions of Earth stations in a satellite switched time-division multiple access communication system having a means for measuring transmission delays. The position of the Earth terminal is triangulated using transmission delay data obtained from message alignment at three or more positions in a satellite's orbit for which coordinates are known. NASA



**N83-31918*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**MULTIBEAM SINGLE FREQUENCY SYNTHETIC APERTURE RADAR PROCESSOR FOR IMAGING SEPARATE RANGE SWATHS Patent**
A. JAIN, inventor (to NASA) (JPL, Calif. Inst. of Tech., Pasadena) 19 Oct. 1982 10 p Filed 3 Jul. 1980 Supersedes N80-32607 (18 - 23, p 3124)
(NASA-CASE-NPO-14525-2; US-PATENT-4,355,311; US-PATENT-APPL-SN-165910; US-PATENT-CLASS-343-5CM; US-PATENT-CLASS-343-9PS; US-PATENT-CLASS-367-88)
Avail: US Patent and Trademark Office CSCL 17I

A single-frequency multibeam synthetic aperture radar for large swath imaging is disclosed. Each beam illuminates a separate "footprint" (i.e., range and azimuth interval). The distinct azimuth intervals for the separate beams produce a distinct Doppler frequency spectrum for each beam. After range correlation of raw data, an optical processor develops image data for the different beams by spatially separating the beams to place each beam of different Doppler frequency spectrum in a different location in the frequency plane as well as the imaging plane of the optical processor. Selection of a beam for imaging may be made in the frequency plane by adjusting the position of an aperture, or in the image plane by adjusting the position of a slit. The raw data may also be processed in digital form in an analogous manner.
Official Gazette of the U.S. Patent and Trademark Office



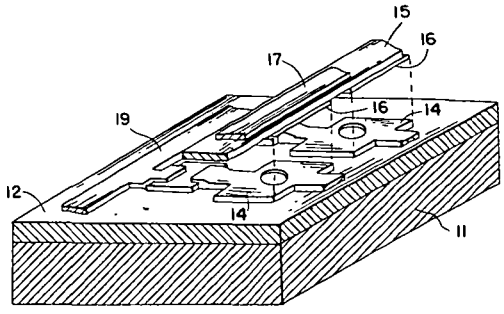
# 33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

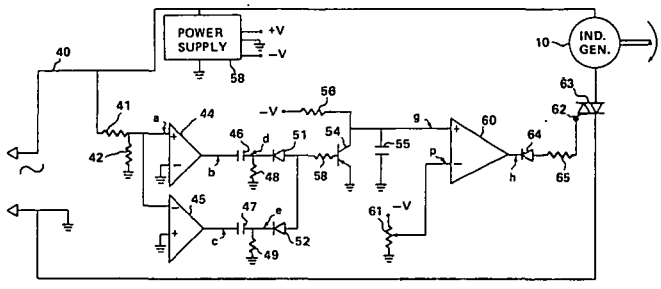
**N83-24763*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**PYROELECTRIC DETECTOR ARRAYS Patent**
A. L. FRIPP, J. B. ROBERTSON, and R. BRECKENRIDGE, inventors (to NASA) 13 May 1982 4 p Filed 13 May 1982
(NASA-CASE-LAR-12363-2; US-PATENT-4,379,970; US-PATENT-APPL-SN-377892; US-PATENT-CLASS-250-388)
Avail: US Patent and Trademark Office CSCL 09A

A pyroelectric detector array and the method for using it are described. A series of holes formed through a silicon dioxide layer on the surface of a silicon substrate forms the mounting fixture for the pyroelectric detector array. A series of nontouching strips of indium are formed around the holes to make contact with the backside electrodes and form the output terminals for individual detectors. A pyroelectric detector strip with front and back electrodes, respectively, is mounted over the strips. Biasing resistors are formed on the surface of the silicon dioxide layer and connected to the strips. A metallized pad formed on the surface of layer is connected to each of the biasing resistors and to the film to provide the ground for the pyroelectric detector array. Official Gazette of the U.S. Patent and Trademark Office



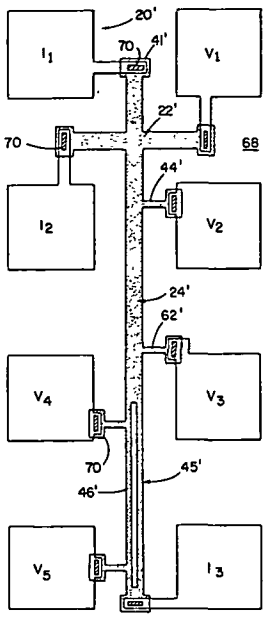

**N83-24768*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**COUPLING AN INDUCTION MOTOR TYPE GENERATOR TO A-C POWER LINES Patent Application**
F. J. NOLA, inventor (to NASA) 31 Mar. 1983 18 p
(NASA-CASE-MFS-25302-2; US-PATENT-APPL-SN-481086)
Avail: NTIS HC A02/MF A01 CSCL 09A

A system for connecting an induction motor type generator to an A.C. power line is described in which an electronic switch is controlled and regulated to turn on at a relatively late point in each half cycle of its operation. The energizing power supplied by the line to the induction motor type generator is decreased and the net power delivered to the line is increased. NASA



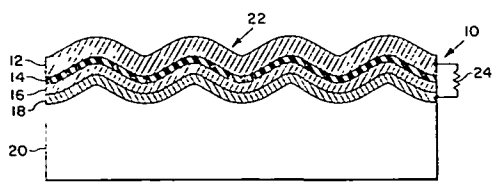

**N83-24769*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**SPLIT-CROSS-BRIDGE-RESISTOR FOR TESTING FOR PROPER FABRICATION OF INTEGRATED CIRCUIT Patent Application**
M. G. BUEHLER, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Jul. 1982 31 p
(NASA-CASE-NPO-16021-1; US-PATENT-APPL-SN-402205)
Avail: NTIS HC A03/MF A01 CSCL 09C

An electrical testing structure and method whereby a test structure is fabricated on, e.g., a large scale integrated circuit wafer along with the circuit components is described. It has a van der Pauw cross resistor in conjunction with a bridge resistor and a split bridge resistor, the latter having two channels each a line width wide, corresponding to the line width of the wafer circuit components, and with the two channels separated by a space equal to the line spacing of the wafer circuit components. The testing structure has associated voltage and current contact pads arranged in a two by four array for conveniently passing currents through the test structure and measuring voltages at appropriate points to calculate the sheet resistance, line width, line spacing, and line pitch of the circuit components on the wafer electrically.
NASA



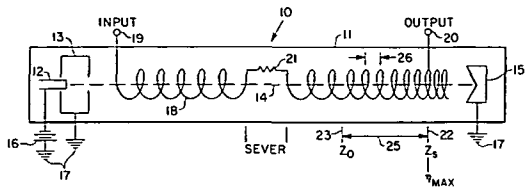

**N83-25983*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**INELASTIC TUNNEL DIODES Patent Application**
L. M. ANDERSON, inventor (to NASA) 19 Apr. 1983 13 p
(NASA-CASE-LEW-13833-1; US-PATENT-APPL-SN-486471)
Avail: NTIS HC A02/MF A01 CSCL 09A

Power is extracted from plasmons, photons, or other guided electromagnetic waves at infrared to mid-ultraviolet frequencies by inelastic tunneling in metal-insulator-semiconductor-metal diodes. Inealstic tunneling produces power by absorbing plasmons to pump electrons to higher potential. Specifically, an electron from a semiconductor layer absorbs a plasmon and simultaneously tunnels across an insulator into a metal layer which is at higher potential. The diode voltage determines the fraction of energy extracted from the plasmons; any excess is lost to heat. NASA




**N83-25984*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**A LINEARIZED TRAVELING WAVE AMPLIFIER WITH HARD LIMITER CHARACTERISTICS Patent Application**
H. G. KOSMAHL, inventor (to NASA) 9 May 1983 13 p
(NASA-CASE-LEW-13981-1; US-PATENT-APPL-SN-492522)
Avail: NTIS HC A02/MF A01 CSCL 09A

A traveling wave tube with increased linearity to avoid intermodulation of signals being amplified is described. A traveling electromagnetic wave and an electron beam interact to effect amplification of a radio frequency signal. L.F.M.




**N83-27126*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**ELECTRONIC SYSTEM FOR HIGH POWER LOAD CONTROL Patent**
E. L. MILLER, inventor (to NASA) (California Inst. of Tech., Pasadena) 24 Dec. 1980 8 p Filed 24 Dec. 1980 Supersedes N83-17805 (21 - 08, p 1176) Sponsored by NASA
(NASA-CASE-NPO-15358-1; US-PATENT-4,382,224;
US-PATENT-APPL-SN-219968; US-PATENT-CLASS-323-269;
US-PATENT-CLASS-323-303; US-PATENT-CLASS-323-350)
Avail: US Patent and Trademark Office CSCL 09C

Parallel current paths are divided into two groups, with control devices in the current paths of one group each having a current limiting resistor, and the control devices in the other group each having no limiting resistor, so that when the control devices of the second group are turned fully on, a short circuit is achieved by the arrangement of parallel current paths. Separate but coordinated control signals are provided to turn on the control devices of the first group and increase their conduction toward saturation as a function of control input, and when fully on, or shortly before, to turn on the control devices of the second group and increase their conduction toward saturation as a function of the control input as that input continues to increase. Electronic means may be used to generate signals. The system may be used for 1-V characteristic measurements of solar arrays as well as for other load control purposes.
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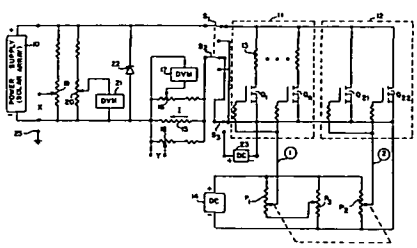

**N83-28319*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**ELECTRICAL POWER GENERATING SYSTEM Patent**
F. J. NOLA, inventor (to NASA) 14 Jun. 1983 4 p Filed 16 Mar. 1981
(NASA-CASE-MFS-25302-1; US-PATENT-4,388,585; US-PATENT-APPL-SN-243683; US-PATENT-CLASS-322-47; US-PATENT-CLASS-322-29; US-PATENT-CLASS-322-35; US-PATENT-CLASS-322-95) Avail: US Patent and Trademark Office CSCL 09C

A power generating system for adjusting coupling an induction motor, as a generator, to an A.C. power line wherein the motor and power line are connected through a triac is described. The triac is regulated to normally turn on at a relatively late point in each half cycle of its operation, whereby at less than operating speed, and thus when the induction motor functions as a motor rather than as a generator, power consumption from the line is substantially reduced.

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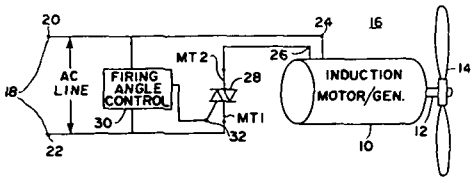
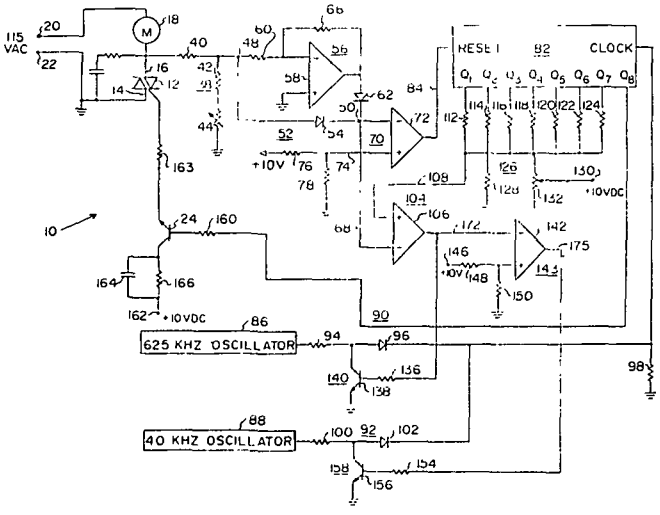


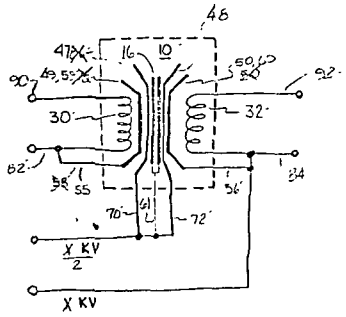

**N83-28329*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**POWER CONTROL FOR AC MOTOR Patent Application**
*R. W. DABNEY, inventor (to NASA) 14 Jun. 1983 15 p*
(NASA-CASE-MFS-25862; US-PATENT-APPL-SN-504345) Avail: NTIS HC A02/MF A01 CSCL 09C

A motor controller employing a triac through which power is supplied to a motor and wherein the open circuit voltage appearing across the triac controls the operation of a timing circuit which triggers on the triac at a time following turn off which varies inversely as a function of the amplitude of the open circuit voltage to the triac is discussed. NASA



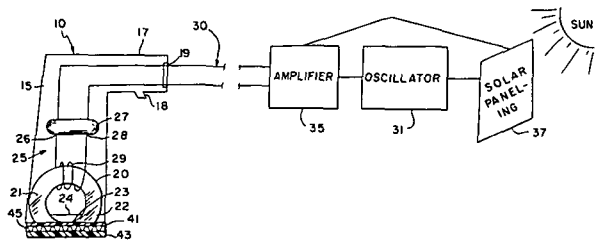

**N83-29590*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**HIGH VOLTAGE ISOLATION TRANSFORMER Patent Application**
C. H. CLATTERBUCK and A. P. RUITBERG, inventors (to NASA) 30 Jun. 1983 13 p
(NASA-CASE-GSC-12817-1; US-PATENT-APPL-SN-506477)
Avail: NTIS HC A02/MF A01 CSCL 09A

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. NASA



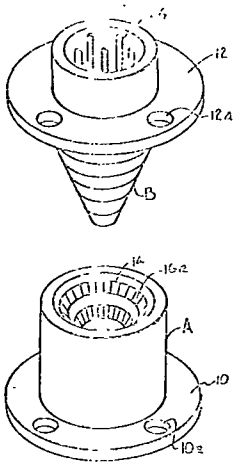

**N83-29591*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**INDUCTION HEATING GUN Patent Application**
J. BUCKLEY, R. L. FOX, R. J. SWAIM, and D. F. JOHNSTON, inventors (to NASA) 24 Jun. 1983 17 p
(NASA-CASE-LAR-13181-1; US-PATENT-APPL-SN-507623)
Avail: NTIS HC A02/MF A01 CSCL 09A

This device of inductively heating and fusing thermoplastics includes 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 arising within 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 to 150 watts of power are passed through the tank circuit, a wire which remains cool under operational wattage is selected, making air or fluid cooling unnecessary. Author



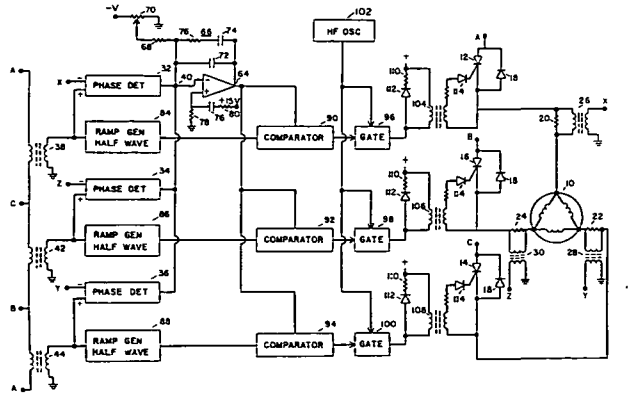
**N83-29592*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**ELECTRICAL SELF-ALIGNING CONNECTOR Patent Application**
K. H. CLARK and D. R. SCOTT, inventors (to NASA) 30 Sep. 1982 13 p
(NASA-CASE-MFS-25211-2; US-PATENT-APPL-SN-432057)
Avail: NTIS HC A02/MF A01 CSCL 09A

A self-aligning electrical connector device is disclosed as including a receptacle component having a conically contoured interior and a plug component having a correspondingly contoured conical body receivable in the receptacle component. The plug component includes a plurality of spaced conductive ring elements 22 having a mating face and the receptacle component includes a plurality of corresponding spaced conductive ring elements providing mating interface with the mating face of the ring elements of the plug component when connected therewith. NASA



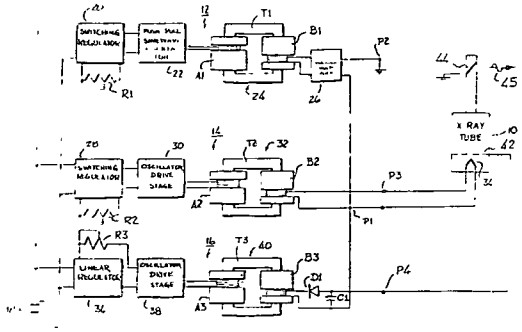

**N83-29593*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**THREE PHASE POWER FACTOR CONTROLLER Patent Application**
F. J. NOLA, inventor (to NASA) 14 Mar. 1983 16 p
(NASA-CASE-MFS-25535-2; US-PATENT-APPL-SN-476244)
Avail: NTIS HC A02/MF A01 CSCL 09A

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. NASA




**N83-29594*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**HIGH VOLTAGE POWER SUPPLY Patent Application**
A. P. RUITBERG and K. M. YOUNG, inventors (to NASA) 6 Jul. 1983 26 p
(NASA-CASE-GSC-12818-1; US-PATENT-APPL-SN-511362)
Avail: NTIS HC A03/MF A01 CSCL 09C

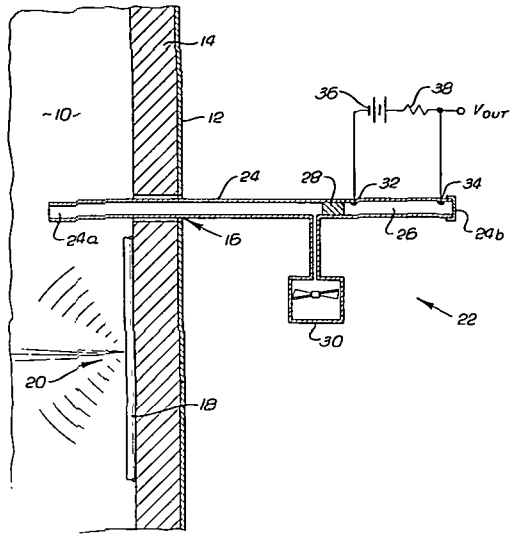
A high voltage power supply is formed by three discrete circuits energized by a battery to provide a plurality of concurrent output signals floating at a high output voltage on the order of several tens of kilovolts. Each circuit has a regulator stage. In the first two circuits, the regulator stages 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. Author




**N83-29595*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**CARBON GRANULE PROBE MICROPHONE FOR LEAK DETECTION Patent Application**
S. P. PARTHASARATHY, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 1 Jun. 1983 10 p
(Contract NAS7-100)
(NASA-CASE-NPO-16027-1; US-PATENT-APPL-SN-500044)
Avail: NTIS HC A02/MF A01 CSCL 09A

A microphone which is not subject to corrosion is provided by employing carbon granules to sense sound waves. The granules are packed into a ceramic tube and no diaphragm is used. A pair of electrodes, located in the tube adjacent the carbon granules, are coupled to a sensing circuit. Sound waves cause pressure changes on the carbon granules which results in a change in resistance in the electrical path between the electrodes. This change in resistance is detected by the sensing circuit. The

microphone is suitable for use as a leak detection probe in recovery boilers, where it provides reliable operation without corrosion problems associated with conventional microphones. NASA




**N83-31952*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**GYROTRON TRANSMITTING TUBE Patent**

H. G. KOSMAHL, inventor (to NASA) 26 Jul. 1983 4 p Filed 24 Dec. 1980 Supersedes N81-16384 (19 - 07 p 0907)
(NASA-CASE-LEW-13429-1; US-PATENT-4,395,656;
US-PATENT-APPL-SN-220212; US-PATENT-CLASS-315-4;
US-PATENT-CLASS-315-3; US-PATENT-CLASS-315-5;
US-PATENT-CLASS-315-5.35; US-PATENT-CLASS-315-5.38)
Avail: US Patent and Trademark Office CSCL 09A

An RF transmitting tube for the 20 GHz to 500 GHz range comprises a gyrotron and a multistage depressed collector. A winding provides a magnetic field which acts on spent, spinning or orbiting electrons changing their motion to substantially forward linear motion in a downstream direction. The spent electrons then pass through a focusser into the collector. Nearly all of the electrons injected into the collector will remain within an imaginary envelope as they travel forward toward the end collector plate. The apertures in the collector plates are at least as large in diameter as the envelope at any particular axial position.

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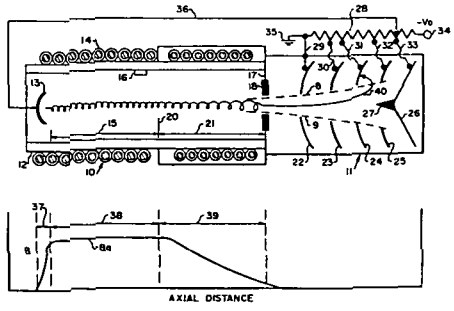


**N83-31953*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**ADAPTIVE REFERENCE VOLTAGE GENERATOR FOR FIRING ANGLE CONTROL OF LINE-COMMUTATED INVERTERS Patent**

C. R. DOLLAND, inventor (to NASA) (Garrett Corp., Torrance, Calif.) 19 Jul. 1983 8 p Filed 7 Aug. 1981 Supersedes N81-31481 (19 - 22, p 3057) Sponsored by NASA
(NASA-CASE-MFS-25215-1; US-PATENT-4,394,610;
US-PATENT-APPL-SN-291131; US-PATENT-CLASS-318-803;
US-PATENT-CLASS-318-809; US-PATENT-CLASS-318-800)
Avail: US Patent and Trademark Office CSCL 09C

A control system for a permanent-magnet motor driven by a multiphase line-commulated inverter is described. It is provided with integrators for integrating the back EMF of each phase of the motor for use in generating system control signals for an inverter gate logic using a sync and firing angle control generator connected to the outputs of the integrators. The firing angle control signals are produced by the control generator by means for combining 120 deg segments of the integrated back EMF signals symmetrical about their maxima into composite positive and negative waveforms, and means for sampling the maxima of each waveform every 120 deg. These samples are then used as positive and negative firing angle control signals. Whereby any change in amplitude of the integrated back EMF signals will not affect a change in the operating power factor of the motor and inverter.

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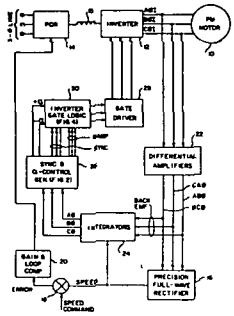

**N83-31954*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**METHOD AND DEVICE FOR DETECTION OF A SUBSTANCE Patent**

L. C. YANG, inventor (to NASA) (JPL, Calif. Inst. of Tech., Pasadena) 6 Jul. 1982 12 p Filed 20 Mar. 1980 Supersedes N80-21723 (18 - 12, p 1582)
(NASA-CASE-NPO-14940-1; US-PATENT-4,338,568;
US-PATENT-APPL-SN-135038; US-PATENT-CLASS-324-466;
US-PATENT-CLASS-73-861.05) Avail: US Patent and Trademark Office CSCL 09C

A device is disclosed in which a discharge grid is provided that has a sufficiently high voltage potential across its grid electrodes so that a substance with predetermined characteristics causes an electric spark discharge to occur between electrodes. The electric spark discharge alters the predetermined characteristics of the substance by oxidation and/or vaporization so that the substance is no longer detectable by an electric spark discharge. A means is provided for counting the number of electric spark discharges. This count indicates the concentration of the substance having the predetermined characteristics. One embodiment disclosed detects longitudinally extending carbon fibers suspended in a gaseous medium. Another embodiment provides for the detection of carbon fibers adhesively attached to

a collection tape. The tape is positioned against the discharge grid and a high voltage is periodically applied across the grid electrodes until electric spark discharges no longer occur.

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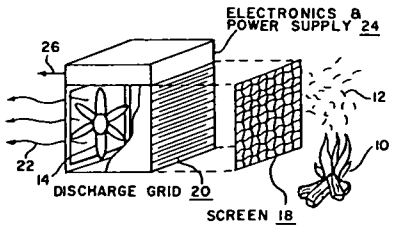


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**N83-34189*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**ACTIVE LAMP PULSE DRIVER CIRCUIT Patent**

K. E. LOGAN, inventor (to NASA) (International Laser Systems, Inc., Orlando, Fla.) 9 Aug. 1983 10 p Filed 24 Jun. 1981 Supersedes N82-10390 (20 - 01, p 0057)
(NASA-CASE-GSC-12566-1; US-PATENT-4,398,129; US-PATENT-APPL-SN-276748; US-PATENT-CLASS-315-208; US-PATENT-CLASS-315-224; US-PATENT-CLASS-315-225; US-PATENT-CLASS-315-237; US-PATENT-CLASS-315-241R; US-PATENT-CLASS-372-25) Avail: US Patent and Trademark Office CSCL 09C

A flashlamp drive circuit is described which uses an unsaturated transistor as a current mode switch to periodically subject a partially ionized gaseous laser excitation flashlamp to a stable, rectangular pulse of current from an incomplete discharge of an energy storage capacitor. A monostable multivibrator sets the pulse interval, initiating the pulse in response to a flash command by providing a reference voltage to a non-inverting terminal of a base drive amplifier; a tap on an emitter resistor provides a feedback signal sensitive to the current amplitude to an inverting terminal of amplifier, thereby controlling the pulse amplitude. The circuit drives the flashlamp to provide a squarewave current flashlamp discharge.

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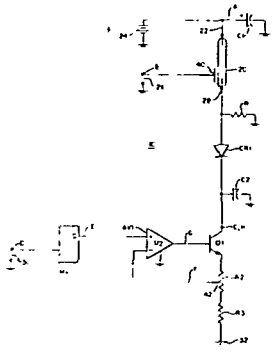

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**N83-34190*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**TRIAC FAILURE DETECTOR Patent**

F. J. NOLA, inventor (to NASA) 23 Aug. 1983 11 p Filed 30 Nov. 1981 Supersedes N82-26574 (20 - 17, p 2397)
(NASA-CASE-MFS-25607-1; US-PATENT-4,400,657; US-PATENT-APPL-SN-325886; US-PATENT-CLASS-318-798; US-PATENT-CLASS-318-806; US-PATENT-CLASS-318-729; US-PATENT-CLASS-361-100; US-PATENT-CLAS-361-90; US-PATENT-CLASS-363-54) Avail: US Patent and Trademark Office CSCL 09C

A failure detector is provided for detecting unidirectional failures in triacs, particularly as used in power factor controllers for induction motors. In a first embodiment, the triac voltage waveform is sensed and upon detection of an unbalanced signal, corresponding to failure of the triac in either the positive or negative direction, the triac is turned full on in both directions. In a second embodiment, a pair of pulsed signals are derived, the pulse durations of which are proportional to the phase difference between the load current and voltage for each half cycle, and the triac is turned full on responsive to a difference in pulse duration between the half cycle signals. An unidirectional open circuit detector is adapted to use a signal from either of the first and second embodiment to turn the triac off in response to an open circuit failure in either direction.

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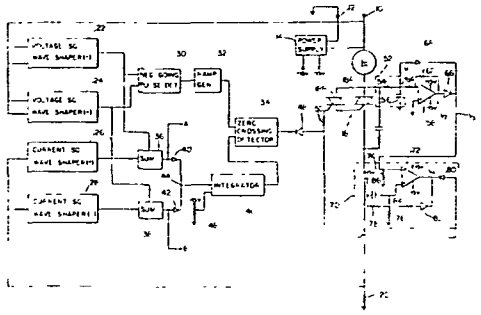

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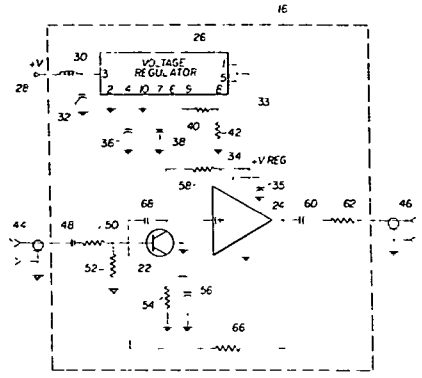
**N83-34191*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**HIGH STABILITY AMPLIFIER Patent**

W. A. ADAMS and V. S. REINHARDT, inventors (to NASA) 30 Aug. 1983 7 p Filed 17 Jul. 1981
(NASA-CASE-GSC-12646-1; US-PATENT-4,401,953; US-PATENT-APPL-SN-284290; US-PATENT-CLASS-330-289; US-PATENT-CLASS-330-310) Avail: US Patent and Trademark Office CSCL 09C

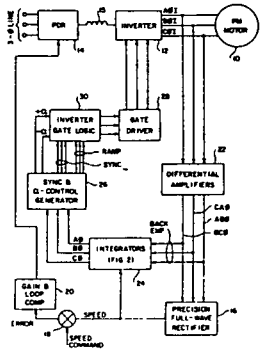
An electrical RF signal amplifier for providing high temperature stability and RF isolation and comprised of an integrated circuit voltage regulator, a single transistor, and an integrated circuit operational amplifier mounted on a circuit board such that passive circuit elements are located on side of the circuit board while the active circuit elements are located on the other side is described. The active circuit elements are embedded in a common heat sink so that a common temperature reference is provided for changes in ambient temperature. The single transistor and operational amplifier are connected together to form a feedback amplifier powered from the voltage regulator with transistor implementing primarily the desired signal gain while the operational amplifier implements signal isolation. Further RF isolation is provided by the voltage regulator which inhibits cross-talk from other like amplifiers powered from a common power supply. Input and output

terminals consisting of coaxial connectors are located on the sides of a housing in which all the circuit components and heat sink are located. E.A.K.



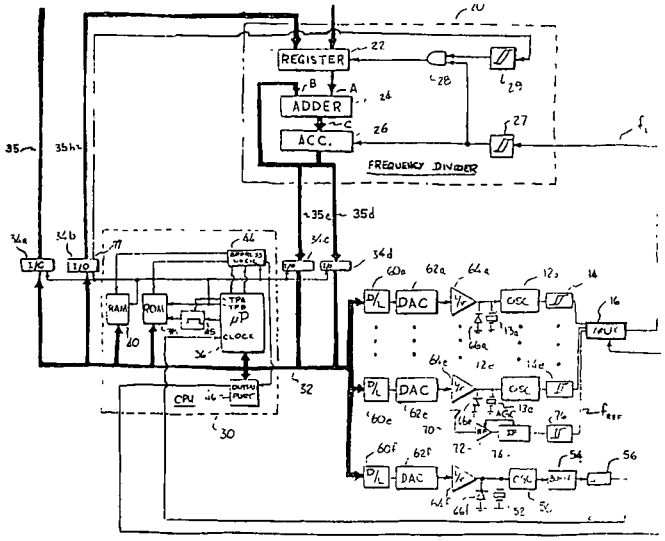

**N83-35227*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**ADAPTIVE CONTROL SYSTEM FOR LINE-COMMUTATED INVERTERS Patent**
C. R. DOLLAND (AiResearch Mfg. Co., Torrance, Calif.) and D. A. BAILEY, inventors (to NASA) (AiResearch Mfg. Co., Torrance, Calif) 30 Aug. 1983 7 p Filed 7 Aug. 1981 Supersedes N81-31480 (19 - 22, p 3057) Sponsored by NASA
(NASA-CASE-MFS-25209-1; US-PATENT-4,401,934; US-PATENT-APPL-SN-291132; US-PATENT-CLASS-318-798; US-PATENT-CLASS-318-685; US-PATENT-CLASS-318-806)
Avail: US Patent and Trademark Office

A control system for a permanent magnet motor driven by a multiphase line commutated inverter is provided with integration for integrating the back EMF of each phase of the motor. This is used in generating system control signals for an inverter gate logic using a sync and firing angle (alpha) control generator connected to the outputs of the integrators. A precision full wave rectifier provides a speed control feedback signal to a phase delay rectifier via a gain and loop compensation circuit and to the integrators for adaptive control of the attenuation of low frequencies by the integrators as a function of motor speed. As the motor speed increases, the attenuation of low frequency components by the integrators is increased to offset the gain of the integrators to spurious low frequencies. NASA




**N83-35228*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**AUTOMATIC OSCILLATOR FREQUENCY CONTROL SYSTEM Patent Application**
S. F. SMITH, inventor (to NASA) (Tennessee Univ., Knoxville) 6 Sep. 1983 28 p Sponsored by NASA
(NASA-CASE-GSC-12804-1; US-PATENT-APPL-SN-529803)
Avail: NTIS HC A03/MF A01 CSCL 09C

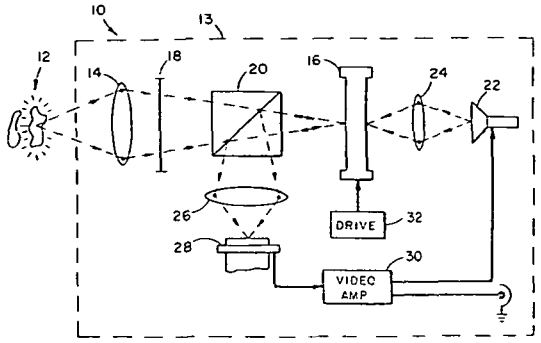
A frequency control system makes an initial correction of the frequency of its own timing circuit after comparison against a frequency of known accuracy and then sequentially checks and corrects the frequencies of several voltage controlled local oscillator circuits. The timing circuit initiates the machine cycles of a central processing unit which applies a frequency index to an input register in a modulo-sum frequency divider stage and enables a multiplexer to clock an accumulator register in the divider stage with a cyclical signal derived from the oscillator circuit being checked. Upon expiration of the interval, the processing unit compares the remainder held as the contents of the accumulator against a stored zero error constant and applies an appropriate correction work to a correction stage to shift the frequency of the oscillator being checked. A signal from the accumulator register may be used to drive a phase plane ROM and, with periodic shifts in the applied frequency index, to provide frequency shift keying of the resultant output signal. Interposition of a phase adder between the accumulator register and phase plane ROM permits phase shift keying of the output signal by periodic variation in the value of a phase index applied to one input of the phase adder. NASA




**N83-35229*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**WIDE DYNAMIC RANGE VIDEO CAMERA Patent Application**
G. D. CRAIG, inventor (to NASA) 8 Sep. 1983 14 p
(NASA-CASE-MFS-25750-1; US-PATENT-APPL-SN-530185)
Avail: NTIS HC A02/MF A01 CSCL 09C

A television camera apparatus is disclosed in which bright objects are attenuated to fit within the dynamic range of the system, while dim objects are not. The apparatus receives linearly polarized light fom 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 deg and focused on the input plane of the video sensor. The light is then converted to an electrical signal, which is amplified and used to excite the CRT. The resulting image is collected and focused by a lens onto the 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 sensor. NASA




**N83-36355*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**FOCAL AXIS RESOLVER FOR OFFSET REFLECTOR ANTENNAS Patent**
R. F. SCHMIDT, inventor (to NASA) 27 Sep. 1983 12 p Filed 2 Oct. 1981 Supersedes N82-10287 (20 - 01, p 0043)
(NASA-CASE-GSC-12630-1; US-PATENT-4,407,001; US-PATENT-APPL-SN-308009; US-PATENT-CLASS-343-840; US-PATENT-CLASS-343-100AP) Avail: US Patent and Trademark Office CSCL 09A

Method and apparatus for determining the focal axis of an asymmetrical antenna such as an offset paraboloid reflector whose physical rim is not coincident with the boundary of the electrical aperture but whose focal point is known is provided. A transmitting feed horn array consisting of at least two feed horn elements is positioned asymmetrically on either side of an estimated focal axis which is generally inclined with respect to the boresight axis of the antenna. The feed horn array is aligned with the estimated focal axis so that the phase centers (CP sub 1, CP sub 2) of the two feed horn elements are located on a common line running through the focal point (F) orthogonally with respect to the estimated focal axis.

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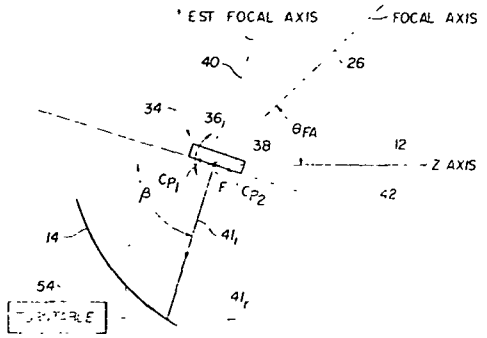


**N83-36356*** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**AUTOMATIC LEVEL CONTROL CIRCUIT Patent**
P. C. TOOLE and D. M. MCCARTHY, inventors (to NASA) 27 Sep. 1983 4 p Filed 17 Jul. 1981 Supersedes N81-29347 (19 - 20, p 2759)
(NASA-CASE-KSC-11170-1; US-PATENT-4,406,989; US-PATENT-APPL-SN-284288; US-PATENT-CLASS-330-110; US-PATENT-CLASS-330-282) Avail: US Patent and Trademark Office CSCL 09C

An automatic level control circuit for an operational amplifier for minimizing spikes or instantaneous gain of the amplifier at a low period wherein no signal is received on the input is provided. The apparatus includes a multibranch circuit which is connected between an output terminal and a feedback terminal. A pair of zener diodes are connected back to back in series with a capacitor provided in one of the branches. A pair of voltage dividing resistors are connected in another of the branches and a second capacitor is provided in the remaining branch of controlling the high frequency oscillations of the operational amplifier.

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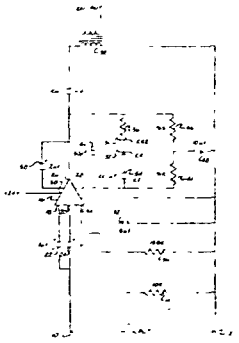

**N83-36357*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ERROR CORRECTION METHOD AND APPARATUS FOR ELECTRONIC TIMEPIECES Patent**
J. R. DAVIDSON and J. S. HEYMAN, inventors (to NASA) 4 Oct. 1983 7 p Filed 13 Feb. 1981
(NASA-CASE-LAR-12654-1; US-PATENT-4,407,589; US-PATENT-APPL-SN-234225; US-PATENT-CLASS-368-201; US-PATENT-CLASS-368-200; US-PATENT-CLASS-368-184)
Avail: US Patent and Trademark Office CSCL 09C

A method and apparatus for correcting errors in an electronic digital timepiece that includes an oscillator which has a 2 in. frequency output, an n-stage frequency divider for reducing the oscillator output frequency to a time keeping frequency, and means for displaying the count of the time keeping frequency. In first and second embodiments of the invention the timepiece is synchronized with a time standard at the beginning of the period of time T. In the first embodiment of the invention the timepiece user observes E (the difference between the time standard and the timepiece time at the end of the period T) and then operates a switch to correct the time of the timepiece and to obtain a count for E. In the second embodiment of the invention, the user operates a switch at the beginning of T and at the end of T and a count for E is obtained electronically.

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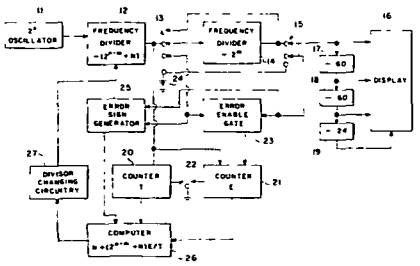


# 34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

**N83-27144*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**CURVED FILM COOLING ADMISSION TUBE Patent**

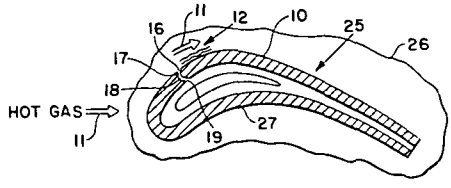
R. W. GRAHAM and S. S. PAPELL, inventors (to NASA) 27 Oct. 1980 6 p Filed 27 Oct. 1980 Supersedes N81-12363 (19 - 03, p 0343)

(NASA-CASE-LEW-13174-1; US-PATENT-4,384,823; US-PATENT-APPL-SN-200634; US-PATENT-CLASS-416-1; US-PATENT-CLASS-415-115; US-PATENT-CLASS-416-97R)

Avail: US Patent and Trademark Office CSCL 20D

Effective film cooling to protect a wall surface from a hot fluid which impinges on or flows along the surface is provided. A film of cooling fluid having increased area is provided by changing the direction of a stream of cooling fluid through an angle of from 135 deg. to 165 deg. before injecting it through the wall into the hot flowing gas. The 1, cooling fluid is injected from an orifice through a wall into a hot flowing gas at an angle to form a cooling fluid film. Cooling fluid is supplied to the orifice from a cooling fluid source via a turbulence control passageway having a curved portion between two straight portions. The angle through which the direction of the cooling fluid is turned results in less mixing of the cooling fluid with the hot gas, thereby substantially increasing the length of the film in a downstream direction.

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




**N83-28356*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**AUTOMATIC THERMAL SWITCH Patent**

J. W. CUNNINGHAM and L. D. WING, inventors (to NASA) 21 Jun. 1983 10 p Filed 21 Dec. 1979 Supersedes N80-21671 (18 - 12, p 1572)

(NASA-CASE-GSC-12553-1; US-PATENT-4,388,965; US-PATENT-APPL-SN-106192; US-PATENT-CLASS-165-32; US-PATENT-CLASS-165-76; US-PATENT-CLASS-165-185)

Avail: US Patent and Trademark Office CSCL 20D

An automatic thermal switch to control heat flow includes two thermally conductive plates and a thermally conductive switch saddle pivotally mounted to the first plate. A flexible heat carrier is connected between the switch saddle and the second plate. A phase-change power unit, including a piston coupled to the switch saddle, is in thermal contact with the first thermally conductive plate. A biasing element biases the switch saddle in a predetermined position with respect to the first plate. When the phase-change power unit is actuated by an increase in heat transmitted through the first place, the piston extends and causes the switch saddle to pivot, thereby varying the thermal conduction between the two plates through the switch saddle and flexible heat carrier. The biasing element, switch saddle, and piston can be arranged to provide either a normally closed or normally opened thermally conductive path between the two plates.

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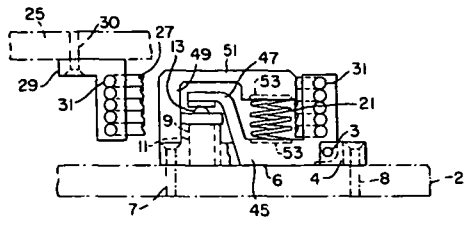



**N83-29625*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**MAGNETIC HEAT PUMPING Patent**

G. V. BROWN, inventor (to NASA) 12 Jul. 1983 9 p Filed 19 Feb. 1981 Supersedes N82-24449 (20 - 15, p 2082)

(NASA-CASE-LEW-12508-3; US-PATENT-4,392,356; US-PATENT-APPL-SN-235868; US-PATENT-CLASS-62-3) Avail: US Patent and Trademark Office CSCL 20D

The method employs ferromagnetic or ferromagnetic elements, preferably of rare-earth based material, for example gadolinium, and preferably employs a regenerator. The steps comprise controlling the temperature and applied magnetic field of the element to cause the state of the element as represented on a temperature-magnetic entropy diagram repeatedly to traverse a loop. The loop may have a first portion of concurrent substantially isothermal or constant temperature and increasing applied magnetic field, a second portion of lowering temperature and constant applied magnetic field, a third portion of isothermal and decreasing applied magnetic field, and a fourth portion of increasing temperature and constant applied magnetic field. Other loops may be four sided, with, for example, two isotherms and two adiabats (constant entropy portions.

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

**N83-30957*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**AIR MODULATION APPARATUS Patent Application**

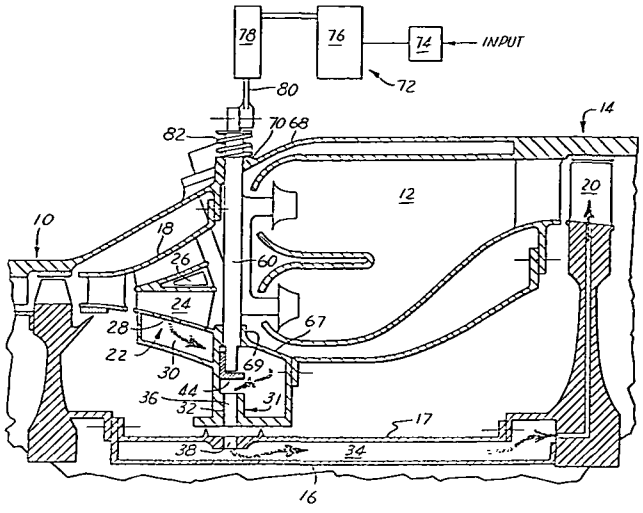
D. T. LENAHAN, R. J. CORSMEIER, and A. P. STERMAN, inventors (to NASA) 25 Feb. 1981 18 p

(NASA-CASE-LEW-13524-1; US-PATENT-APPL-SN-238257)

Avail: NTIS HC A02/MF A01 CSCL 20D

An air modulation apparatus, such as for use in modulating cooling air to the turbine section of a gas turbine engine includes a valve means disposed around an annular conduit, such as a nozzle, in the engine cooling air circuit. The valve means, when in a closed position, blocks a portion of the conduit, and thus

reduces the amount and increases the velocity of cooling air flowing through the nozzle. The apparatus also includes actuation means, which can operate in response to predetermined engine conditions, for enabling opening and closing of the valve. NASA




**N83-31993*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**SYSTEM FOR MONITORING PHYSICAL CHARACTERISTICS OF FLUIDS Patent**

E. H. TRINH (JPL, California Inst. of Tech., Pasadena) and T. G. WANG, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 5 Jul. 1983 7 p Filed 23 Mar. 1981 Supersedes N81-34384 (19 - 15, p 2055) Sponsored by NASA (NASA-CASE-NPO-15400-1; US-PATENT-4,391,129; US-PATENT-APPL-SN-246774; US-PATENT-CLASS-73-64.4; US-PATENT-CLASS-250-573) Avail: US Patent and Trademark Office CSCL 20D

An apparatus and method are described for measuring physical characteristics of fluid, by placing a drop of the fluid in a batch of a second fluid and passing acoustic waves through the bath. The applied frequency of the acoustic waves is varied, to determine the precise value of a frequency at which the drop undergoes resonant oscillations. The resonant frequency indicates the interfacial tension of the drop in the bath, and the interfacial tension can indicate physical properties of the fluid in the drop.

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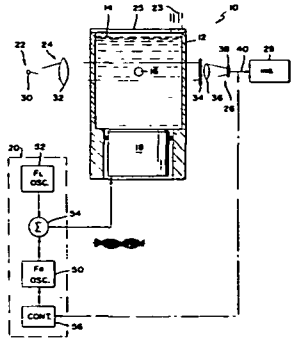

**N83-34221*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**HEATING AND COOLING SYSTEM Patent**

L. A. IMIG and M. R. GARDNER, inventors (to NASA) 31 Aug. 1982 6 p Filed 30 Apr. 1980 Supersedes N80-25693 (18 - 16, p 2138) (NASA-CASE-LAR-12393-1; US-PATENT-4,346,754; US-PATENT-APPL-SN-145208; US-PATENT-CLASS-374-46; US-PATENT-CLAS-165-27; US-PATENT-CLASS-165-61; US-PATENT-CLASS-165-80E; US-PATENT-CLASS-165-12; US-PATENT-CLASS-62-62; US-PATENT-CLASS-62-514R) Avail: US Patent and Trademark Office CSCL 20D

A heating and cooling apparatus capable of cyclic heating and cooling of a test specimen undergoing fatigue testing is discussed. Cryogenic fluid is passed through a block clamped to the speciment to cool the block and the specimen. Heating cartridges penetrate the block to heat the block and the specimen to very hot temperaures. Control apparatus is provided to alternatively activate the cooling and heating modes to effect cyclic heating and cooling between very hot and very cold temperatures. The block is constructed of minimal mass to facilitate the rapid temperature changes.

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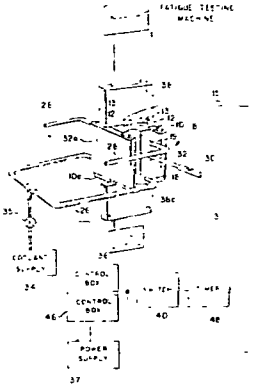

**N83-35307*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**HEAT PIPE THERMAL SWITCH Patent**

D. A. WOLF, inventor (to NASA) (Dynatherm Corp., Cockeysville, Md.) 6 Sep. 1983 6 p Filed 16 Oct. 1982 Supersedes N83-12525 (21 - 03, p 0390) (NASA-CASE-12812-1; US-PATENT-4,402,358; US-PATENT-APPL-SN-434674; US-PATENT-CLASS-165-32; US-PATENT-CLASS-165-104.26) Avail: US Patent and Trademark Office CSCL 20D

A thermal switch for controlling the dissipation of heat between a body is described. The thermal switch is comprised of a flexible bellows defining an expansible vapor chamber for a working fluid located between an evaporation and condensation chamber. Inside the bellows is located a coiled retaining spring and four axial metal mesh wicks, two of which have their central portions located inside of the spring while the other two have their central portions located between the spring and the side wall of the bellows. The wicks are terminated and are attached to the inner surfaces of the outer end walls of evaporation and condensation chambers respectively located adjacent to the heat source and heat sink. The inner surfaces of the end walls furthermore include grooves

to provide flow channels of the working fluid to and from the wick ends. The evaporation and condensation chambers are connected by turnbuckles and tension springs to provide a set point adjustment for setting the gap between an interface plate on the condensation chamber and the heat sink.

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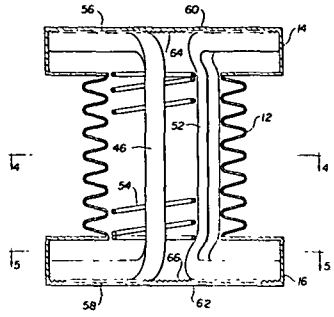

# 35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

**N83-24828*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**GAS LEVITATOR HAVING FIXED LEVITATION NODE FOR CONTAINERLESS PROCESSING Patent**

L. H. BERGE, W. A. ORAN, and M. THEISS, inventors (to NASA) 28 Aug. 1981 7 p Filed 28 Aug. 1981 Supersedes N82-10359 (20 - 01, p 52)
(NASA-CASE-MFS-25509-1; US-PATENT-4,378,209; US-PATENT-APPL-SN-297486; US-PATENT-CLASS-432-58; US-PATENT-CLASS-34-57A; US-PATENT-CLASS-156-DIG.62; US-PATENT-CLASS-432-227) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus is disclosed for levitating a specimen of material in a containerless environment at a stable nodal position independent of gravity. An elongated levitation tube has a contoured interior in the form of convergent section, constriction, and a divergent section in which the levitation node is created. A gas flow control means prevents separation of flow from the interior walls in the region of a specimen. The apparatus provides for levitating and heating the specimen simultaneously by combustion of a suitable gas mixture combined with an inert gas.

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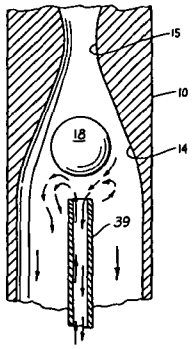

**N83-27184*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**PARTICLE ANALYZING METHOD AND APPARATUS Patent**

M. P. SINHA (JPL, California Inst. of Tech., Pasadena), C. E. GRIFFIN (JPL, California Inst. of Tech., Pasadena), D. D. NORRIS (JPL, California Inst. of Tech. Pasadena), and S. K. FRIEDLANDER, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 17 Nov. 1980 5 p Filed 17 Nov. 1980 Supersedes N83-18089 (21 - 08, p 1218) Sponsored by NASA
(NASA-CASE-NPO-15292-1; US-PATENT-4,383,171; US-PATENT-APPL-SN-207135; US-PATENT-CLASS-250-282; US-PATENT-CLASS-250-288; US-PATENT-CLASS-250-423)
Avail: US Patent and Trademark Office CSCL 14B

The rapid chemical analysis of particles in aerosols can be accomplished using an apparatus which produces a controlled stream of individual particles from an environment, and another apparatus which vaporizes and ionizes the particles moving in free flight, for analysis by a mass spectrometer. The device for producing the stream of particles includes a capillary tube through which the air with suspended particles moves, a skimmer with a small opening spaced from an end of the capillary tube to receive particles passing through the tube, and a vacuum pump which removes air from between the tube and skimmer and creates an inflow of air and particles through the tube. The particles passing through the skimmer opening can be simultaneously vaporized and ionized while in free flight, by a laser beam of sufficient intensity that is directed across the path of the free flying particles.

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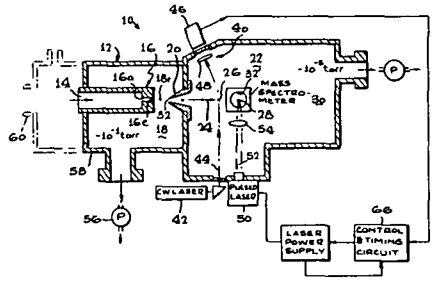

**N83-29650*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**METHOD AND APPARATUS FOR SUPERCOOLING AND SOLIDIFYING SUBSTANCES Patent**

L. L. LACY, M. B. ROBINSON, T. J. RATHZ, L. KATZ, and D. B. NISEN, inventors (to NASA) 28 Jun. 1983 7 p Filed 23 Mar. 1981 Supersedes N81-24413 (19 - 15, p 2059)
(NASA-CASE-MFS-25242-1; US-PATENT-4,389,904; US-PATENT-APPL-SN-246773; US-PATENT-CLASS-73-863.11; US-PATENT-CLASS-374-17) Avail: US Patent and Trademark Office CSCL 14B

An enclosure provides a containerless environment in which a sample specimen is positioned. The specimen is heated in the containerless environment, and the specimen melt is dropped through the tube in which it cools by radiation. The tube is alternatively backfilled with an inert gas whereby the specimen melt cools by both radiation and convection during its free fall. During the free fall, the sample is in a containerless, low-gravity environment which enhances supercooling in the sample and prevents sedimentation and thermal convection influences. The sample continues to supercool until nucleation occurs which is detected by silicon photovoltaic detectors. The sample solidifies after nucleation and becomes completely solid before entering the detachable catcher. The amount of supercooling of the

specimen can be measured by knowing the cooling ratio and determining the time for nucleation to occur.

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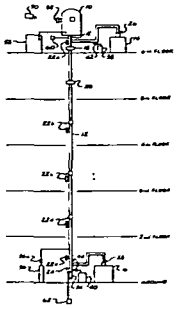

**N83-29651*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**INSTRUMENT FOR DETERMINING COINCIDENCE AND ELAPSE TIME BETWEEN INDEPENDENT SOURCES OF RANDOM SEQUENTIAL EVENTS Patent**

J. I. CLEMMONS, JR., inventor (to NASA) 12 Jul. 1983 10 p Filed 10 Jul. 1981 Supersedes N81-31529 (19 - 22, p 3064) (NASA-CASE-LAR-12531-1; US-PATENT-4,392,749; US-PATENT-APPL-SN-282191; US-PATENT-CASE-368-118; US-PATENT-CASE-368-6; US-PATENT-CASE-368-9; US-PATENT-CASE-368-10; US-PATENT-CASE-368-119; US-PATENT-CASE-368-120) Avail: US Patent and Trademark Office CSCL 14B

An instrument that receives pulses from a primary external source and one or more secondary external sources and determines when there is coincidence between the primary and one of the secondary sources is described. The instrument generates a finite time window (coincidence aperture) during which coincidence is defined to have occurred. The time intervals between coincidence apertures in which coincidences occur are measured.

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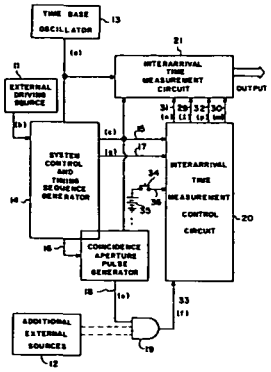


**N83-29652*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**DEGASSIFYING AND MIXING APPARATUS FOR LIQUIDS Patent**

S. T. YAMAUCHI, inventor (to NASA) (Rockwell International Corp., Downey, Calif.) 12 Jul. 1983 6 p Filed 25 Nov. 1981 Supersedes N82-22329 (20 - 13, p 1773) Sponsored by NASA (NASA-CASE-MSC-18936-1; US-PATENT-4,392,874; US-PATENT-APPL-SN-325082; US-PATENT-CLASS-55-194; US-PATENT-CLASS-55-202) Avail: US Patent and Trademark Office CSCL 14B

An apparatus for degassing a liquid comprises a containment vessel a liquid pump and a header assembly (12) within the containment vessel in a volume above the reservoir of the liquid. The pump draws from this reservoir and outputs to the header assembly, the latter being constructed to return the liquid to the reservoir in the form of a number of stacked, vertically spaced, concentric, conical cascades via orifices. A vacuum source provides a partial vacuum in the containment vessel to enhance the degassing process.

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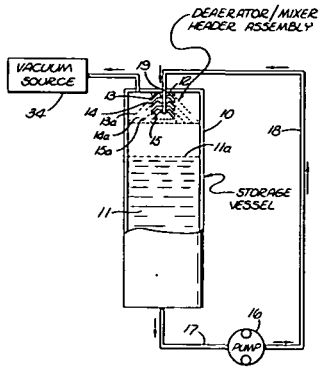


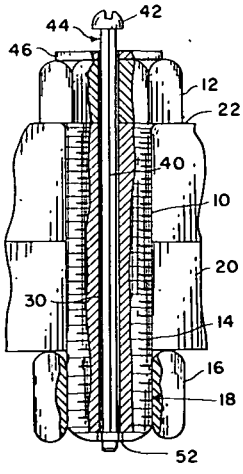

**N83-29654*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**SECURABLE BEARING STRESS-STRAIN INDICATOR Patent Application**

M. J. LONG, inventor (to NASA) 27 Jun. 1983 13 p (NASA-CASE-LAR-12774-1; US-PATENT-APPL-SN-508390) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention relates to a stress-strain indicator for indicating torque on a fastening member or other tensile structure. The device is particularly useful in the continued monitoring of torque on the bolts incorporated in pressure vessels and other high stress structures. The device indicates torque by utilizing the principles of stress-strain; a given stress on a bolt will result in a calculable amount of strain (stretching) within the shaft of the bolt. A test pin, therefore, is inserted through an axial bore in the bolt and is anchored with respect to the bolt at a point along its length. A washer is positioned between a flange of the test pin and the bolt head; the washer and the flange are separated by a space. Torque on the bolt changes its length; the length change causes axial displacement of the test pin with the resultant progressive elimination of the space until the washer is secured at the calibrated torque.

NASA



**N83-32026*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**VIBRATION ISOLATION AND PRESSURE COMPENSATION APPARATUS FOR SENSITIVE INSTRUMENTATION Patent**
R. D. AVERILL, inventor (to NASA) 26 Jul. 1983 6 p Filed 16 Aug. 1982 Supersedes N83-12398 (21 - 03, p 0371)
(NASA-CASE-LAR-12728-1; US-PATENT-4,394,819; US-PATENT-APPL-SN-408575; US-PATENT-CLASS-62-514 R; US-PATENT-CLASS-62-295; US-PATENT-CLASS-248-636; US-PATENT-CLASS-248-638) Avail: US Patent and Trademark Office CSCL 14B

A system for attenuating the inherent vibration associated with a mechanical refrigeration unit employed to cryogenically cool sensitive instruments used in measuring chemical constituents of the atmosphere is described. A modular system including an instrument housing and a reaction bracket with a refrigerator unit floated there between comprise the instrumentation system. A pair of evacuated bellows that 'float' refrigerator unit and provide pressure compensation at all levels of pressure from seal level to the vacuum of space. Vibration isolators and when needed provide additional vibration damping for the refrigerator unit. A flexible thermal strap (20 K) serves to provide essentially vibration free thermal contact between cold tip of the refrigerator unit and the instrument component mounted on the IDL mount. Another flexible strap (77 K) serves to provide vibration free thermal contact between the TDL mount thermal shroud and a thermal shroud disposed about the thermal shaft.

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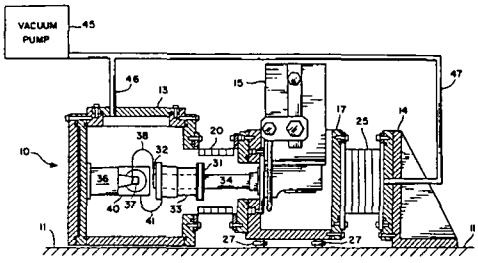


**N83-34272*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**SCANNING SEISMIC INTRUSION DETECTION METHOD AND APPARATUS Patent**
R. D. LEE, inventor (to NASA) 15 Feb. 1983 8 p Filed 28 Jan. 1981 Supersedes N81-19430 (19 - 10, p 1350)
(NASA-CASE-ARC-11317-1; US-PATENT-4,374,378; US-PATENT-APPL-SN-229231; US-PATENT-CLASS-340-566; US-PATENT-CLASS-340-518) Avail: US Patent and Trademark Office CSCL 14B

An intrusion monitoring system includes an array of seismic sensors, such as geophones, arranged along a perimeter to be monitored for unauthorized intrusion as by surface movement or tunneling. Two wires lead from each sensor to a central monitoring station. The central monitoring station has three modes of operation. In a first mode of operation, the output of all of the seismic sensors is summed into a receiver for amplification and detection. When the amplitude of the summed signals exceeds a certain predetermined threshold value an alarm is sounded. In a second mode of operation, the individual output signals from the sensors are multiplexed into the receiver for sequentially interrogating each of the sensors.

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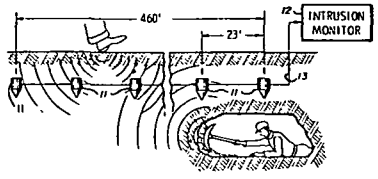
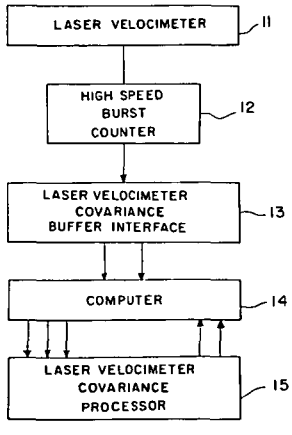



**N83-34273*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**AUTO COVARIANCE COMPUTER Patent Application**
T. E. HEPNER and J. L. MEYERS, inventors (to NASA) 16 Aug. 1983 12 p
(NASA-CASE-LAR-12968-1; US-PATENT-APPL-SN-523560)
Avail: NTIS HC A02/MF A01 CSCL 14B

A laser velocimeter covariance processor which calculates the auto covariance and cross covariance functions for a turbulent flow field based on Poisson sampled measurements in time from a laser velocimeter is described. The device will process a block of data that is up to 4096 data points in length and return a 512 point covariance function with 48-bit resolution along with a 512 point histogram of the interarrival times which is used to normalize the covariance function. The device is designed to interface and be controlled by a minicomputer from which the data is received and the results returned. A typical 4096 point computation takes approximately 1.5 seconds to receive the data, compute the covariance function, and return the results to the computer.

NASA



**N83-35338*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**JOINING LEAD WIRES TO THIN PLATINUM ALLOY FILMS**
J. S. PRZYBYSZEWSKI (United Technologies Corp., East Hartford, Conn.) and R. G. CLAING, inventors (to NASA) (United Technologies Corp., East Hartford, Conn.) 6 Sep. 1983 8 p Filed 4 Dec. 1980 Supersedes N83-19949 (21 - 10, p 1496)
(NASA-CASE-LEW-13934-1; US-PATENT-4,402,447; US-PATENT-APPL-SN-212949; US-PATENT-CLASS-228-103; US-PATENT-CLASS-228-193; US-PATENT-CLASS-228-263.18; US-PATENT-CLASS-415-118) Avail: US Patent and Trademark Office CSCL 14B

A two step process of joining a lead wire to .000002 m thick platinum alloy film which rests upon an equally thin alumina insulating layer which is adhered to a metal substrate is described. Typically the platinum alloy film forms part of a thermocouple for measuring the surface temperature of a gas turbine airfoil. In the first step the lead wire is deformed 30 to 60% at room temperature while the characteristic one million ohm resistance of the alumina insulating layer is monitored for degradation. In the second step the cold pressed assembly is heated at 865 to 1025 C for 4 to 75 hr in air. During the heating step any degradation of insulating layer resistance may be reversed, provided the resistance was not decreased below 100 ohm in the cold pressing.

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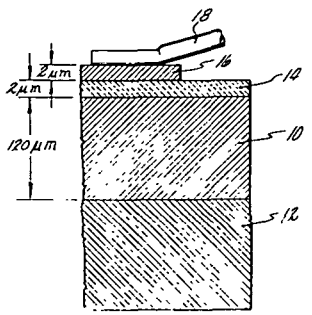


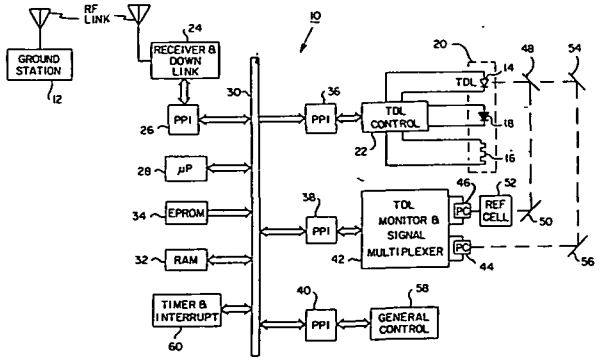

# 36 LASERS AND MASERS

Includes parametric amplifiers.

**N83-24842*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**DIGITAL CONTROL OF DIODE LASER FOR ATMOSPHERIC SPECTROSCOPY Patent Application**
R. T. MENZIES (JPL, California Inst. of Tech., Pasadena) and C. W. RUTLEDGE, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 3 Jun. 1982 21 p
(NASA-CASE-NPO-16000-1; US-PATENT-APPL-SN-384547)
Avail: NTIS HC A02/MF A01 CSCL 20E

The absorption spectra of trace species can be remotely determined using a diode laser tunable over a useful spectral region of 50/cm to 200/cm by control of diode laser temperature over range from 15 K to 100 K, and tunable over a smaller region of typically 0.1/cm to 10/cm by control of the diode laser current over a range from 0 to 2 amps. Diode laser temperature and current set points are transmitted to the instrument in digital form and stored in memory for retrieval under control of a microprocessor during measurements. The laser diode current is determined by a digital-to-analog converter through a field-effect transistor for a high degree of ambient temperature stability, while the laser diode temperature is determined by set points entered into a digital-to-analog converter under control of the microprocessor. Temperature of the laser diode is sensed by a sensor diode to provide negative feedback to the temperature control circuit that responds to the temperature control digital-to-analog converter.

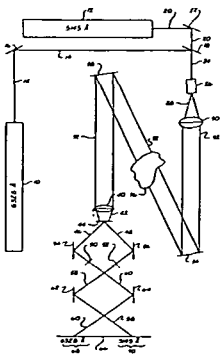
NASA




**N83-29680*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**DUAL LASER OPTICAL SYSTEM AND METHOD FOR STUDYING FLUID FLOW Patent**
R. B. OWEN and W. K. WITHEROW, inventors (to NASA) 5 Jul. 1983 4 p Filed 12 Jan. 1981 Supersedes N81-19440 (19 - 10, p 1351)
(NASA-CASE-MFS-25315-1; US-PATENT-4,391,518; US-PATENT-APPL-SN-224232; US-PATENT-CASE-356-129)
Avail: US Patent and Trademark Office CSCL 20E

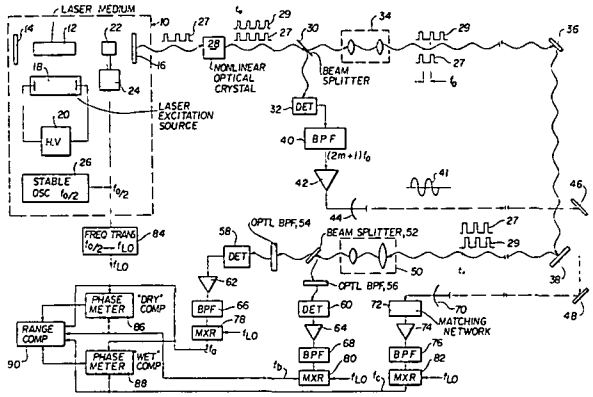
A dual laser optical system and method is disclosed for visualization of phenomena in transport substances which induce refractive index gradients such as fluid flow and pressure and temperature gradients in fluids and gases. Two images representing mutually perpendicular components of refractive index gradients may be viewed simultaneously on screen. Two lasers having wave lengths in the visible range but separated by about 1000 angstroms are utilized to provide beams which are collimated into a beam containing components of the different wave lengths. The collimated beam is passed through a test volume of the transparent substance. The collimated beam is then separated into components of the different wave lengths and focused onto a pair of knife edges arranged mutually perpendicular to produce and project images onto the screen.

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



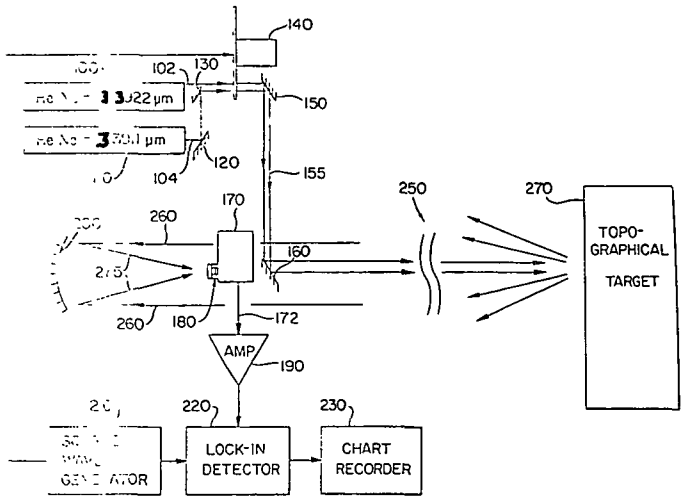
**N83-29681*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**GEODETIC DISTANCE MEASURING APPARATUS Patent Application**
J. B. ABSHIRE, inventor (to NASA) 7 Apr. 1983 21 p
(NASA-CASE-GSC-12609-2; US-PATENT-APPL-SN-481020)
Avail: NTIS HC A02/MF A01 CSCL 20E

A mode locked laser system including a laser device and its peripheral components is utilized for deriving two mutually phase locked optical wavelength signals and one phase locked microwave CW signal which respectively traverse the same distance measurement path. Preferably the optical signals are comprised of pulse type signals. Phase comparison of the two optical wavelength pulse signals is used to provide a measure of the dry air density while phase comparison of one of the optical wavelength pulse signals and the microwave CW signal is used to provide a measure of the wet or water vapor density of the air. From these measurements is computed in means of the distance to be measured corrected for the atmospheric dry and water vapor densities in the measurement path. NASA



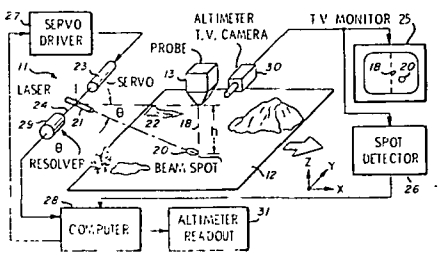

**N83-33137*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**PORTABLE LASER REMOTE SYSTEM FOR METHANE GAS DETECTION Patent Application**
W. B. GRANT (JPL, Pasadena, Calif.) and E. D. HINKLEY, JR., inventors (to NASA) (JPL, Pasadena, Calif.) 24 Sep. 1982 30 p Sponsored by NASA
(NASA-CASE-NPO-15790-1; US-PATENT-APPL-SN-423016)
Avail: NTIS HC A03/MF A01 CSCL 20E

The transmitter for a portable system for the remote detection of methane gas leaks and concentrations includes two lasers, tuned respectively to a wavelength coincident with a strong absorption line of methane and a reference wavelength which is weakly absorbed by methane gas. The lasers are aimed at a topographical target along a system axis and the beams successively interrupted by a chopper wheel. The system receiver includes a spherical mirror for collecting the reflected laser radiation and focusing the collected radiation through a narrowband optical filter onto an optical detector. The filter is tuned to the wavelength of the two lasers, and rejects background noise to substantially improve the signal-to-noise ratio of the detector. The output of the optical detector is processed by a lock-in detector synchronized to the chopper, and which measures the difference between the first wavelength signal and the reference wavelength signal.
NASA




**N83-34304*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**SIDELOOKING LASER ALTIMETER FOR A FLIGHT SIMULATOR Patent**
L. D. WEBSTER, inventor (to NASA) 5 Jul. 1983 17 p Filed 13 Feb. 1981 Supersedes N81-19439 (19 - 10, p 1351)
(NASA-CASE-ARC-11312-1; US-PATENT-4,391,514; US-PATENT-APPL-SN-234224; US-PATENT-CLASS-356-1; US-PATENT-CLASS-356-4; US-PATENT-CLASS-358-104; US-PATENT-CLASS-358-109; US-PATENT-CLASS-434-4; US-PATENT-CLASS-434-38) Avail: US Patent and Trademark Office CSCL 20E

An improved laser altimeter for a flight simulator which allows measurement of the height of the simulator probe above the terrain directly below the probe tip is described. A laser beam is directed from the probe at an angle theta to the horizontal to produce a beam spot on the terrain. The angle theta that the laser beam makes with the horizontal is varied so as to bring the beam spot into coincidence with a plumb line coaxial with the longitudinal axis of the probe. A television altimeter camera observes the beam spot and has a raster line aligned with the plumb line. Spot detector circuit coupled to the output of the TV camera monitors the position of the beam spot relative to the plumb line.
Official Gazette of the U.S. Patent and Trademark Office



**N83-35350*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**RESONANT ISOLATOR FOR MASER AMPLIFIER Patent**
R. C. CLAUSS (JPL, California Inst. of Tech., Pasadena) and R. B. QUINN, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 16 Aug. 1983 7 p Filed 23 Mar. 1981 Supersedes N81-24426 (19 - 15, p 2061) Sponsored by NASA
(NASA-CASE-NPO-15201-1; US-PATENT-4,399,415; US-PATENT-APPL-SN-246778; US-PATENT-CLASS-330-4; US-PATENT-CLASS-332-7.5; US-PATENT-CLASS-333-24.2)
Avail: US Patent and Trademark Office CSCL 20E

An isolator is described for use in a low noise maser amplifier, which provides low loss across a wide bandwidth and which can be constructed at moderate cost. The isolator includes a train of garnet or ferrite elements extending along the length of a microwave channel parallel to the slow wave structure, with the elements being of staggered height, so that the thin elements which are resonant to the microwaves are separated by much thicker elements. The thick garnet or ferrite elements reduce the magnetic flux passing through the thin elements to permit altering of the shape of the thin elements so as to facilitate their fabrication and to provide better isolation with reduced loss, by increasing the thickness of the thin elements and decreasing their length and width.

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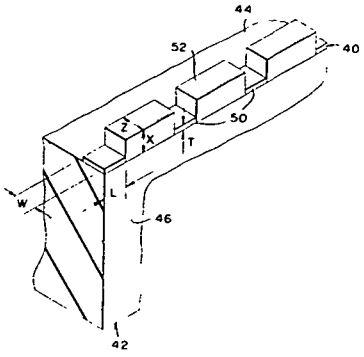


# 37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

**N83-26078*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**VARIABLE SPEED DRIVE Patent**
H. D. OBLER, inventor (to NASA) 26 Apr. 1983 6 p Filed 27 Feb. 1981
(NASA-CASE-GSC-12643-1; US-PATENT-4,381,174; US-PATENT-APPL-SN-238786; US-PATENT-CLASS-417-15; US-PATENT-CLASS-47-26) Avail: US Patent and Trademark Office CSCL 13I

A variable speed drive wherein a first embodiment is comprised of a pivotally mounted prime mover coupled to a rotary fluid output device, such as a fan or pump, through a variable and fixed pulley drive arrangement is described. The pivotal position of the prime mover and accordingly the pitch diameter of variable pulley means is controlled in accordance with fluid motor means coupled to the prime mover. This is actuated in response to a fluid feedback control signal derived from a sensed output of the rotary fluid output device. The pivotal motion of the prime mover imparts an arcuate motion to the variable pulley means which effects a speed variation of the rotary fluid output device in accordance with the variation of the pitch diameter ratio of opposing variable and fixed pulley means.

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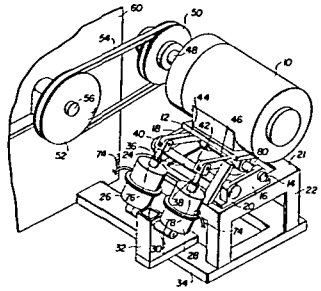
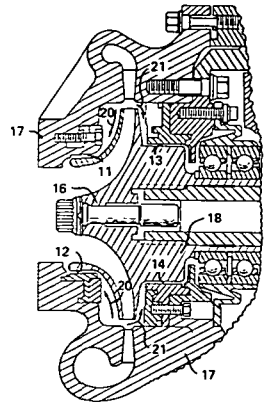



**N83-26080*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**DAMPING SEAL FOR TURBOMACHINERY Patent Application**
G. L. VONPRAGENAU, inventor (to NASA) 28 Apr. 1983 11 p
(NASA-CASE-MFS-25842-1; US-PATENT-APPL-SN-489902)
Avail: NTIS HC A02/MF A01 CSCL 11A

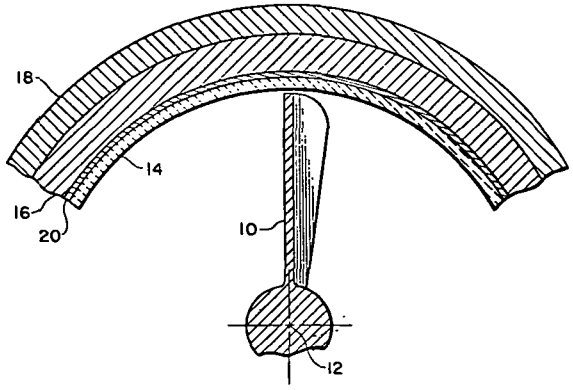
A damping seal between a high speed rotor member and stator member that separates pressurized fluid compartments is described. The rotor member has a smooth outer surface and the stator member has a bore surface roughened by a plurality of pockets or depressions. NASA




**N83-28450*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**FULLY PLASMA-SPRAYED COMPLIANT BACKED CERAMIC TURBINE SEAL Patent Application**
R. C. BILL and D. W. WISANDER, inventors (to NASA) 1 Jun. 1983 8 p
(NASA-CASE-LEW-13268-3; US-PATENT-APPL-SN-500045)
Avail: NTIS HC A02/MF A01 CSCL 11A

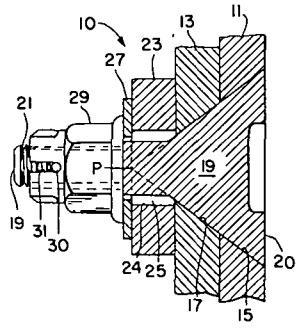
This invention is concerned with a seal having a high temperature abradable lining material encircling the tips of turbine blades in turbomachinery. The invention is particularly directed to maintaining the minimum operating clearance between the blade tips and the lining of a high pressure turbine. A low temperature easily decomposable material, such as a polymer, in powder form is blended with a high temperature oxidation resistant metal powder. The two materials are simultaneously deposited on a substrate formed by the turbine casing. Alternately, the polymer powder may be added to the metal powder during plasma spraying. A

bond coating is then applied to the metal-polymer composite. A ceramic layer forming a shroud is deposited on the bond coating. The polymer additive mixed with the metal is then completely volatilized to provide a porous layer between the ceramic layer and the substrate. NASA



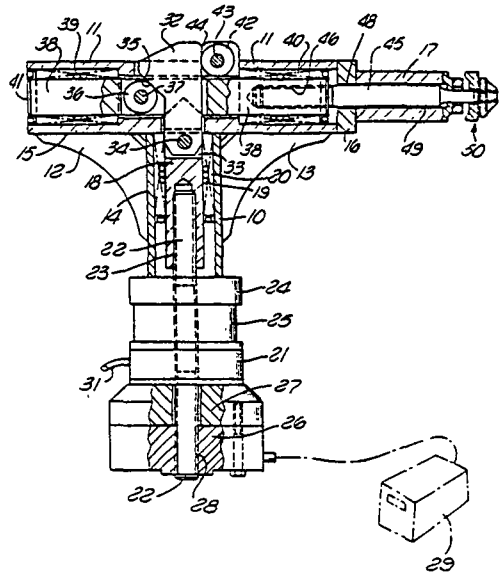

**N83-29706*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**DAZE FASTENERS Patent Application**
L. R. JACKSON, R. C. DAVIS, and A. H. TAYLOR, inventors (to NASA) 17 May 1983 18 p
(NASA-CASE-LAR-13009-1; US-PATENT-APPL-SN-495380)
Avail: NTIS HC A02/MF A01 CSCL 13E

A daze fastener system is disclosed for connecting two or more structural elements wherein the structural elements and fastener parts have substantially different coefficient of thermal expansion physical property characteristics. By providing frusto-conical abutting surfaces between the structural elements and fastener parts, any differences in thermal expansion/contraction between the parts is translated to sliding motion and avoids deleterious thermal stresses in the connection. An essential feature for isotropic homogeneous material connections is that at least two sets of mating surfaces are required in which each set of mating surfaces has line element extensions that pass through a common point. NASA




**N83-29707*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**PORTABLE 90 DEG PROOF LOADING DEVICE Patent Application**
R. G. BIRD, inventor (to NASA) (Rockwell International Corp., Pittsburgh) and L. A. BERSON (Rockwell International Corp., Pittsburgh) 3 May 1983 19 p Sponsored by NASA
(NASA-CASE-MSC-20250-1; US-PATENT-APPL-SN-491113)
Avail: NTIS HC A02/MF A01 CSCL 13I

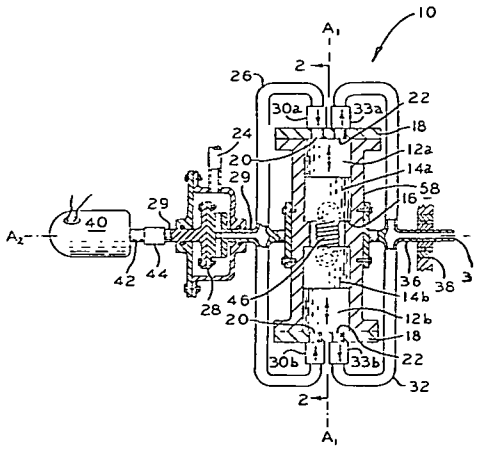
A hydraulically actuated device is described for applying a test load to a bearing or the like to prove the integrity of its mounting or staking within a bore in a housing such as a gear case. To accommodate limited access situations, the device is constructed in a right angle configuration in which a hydraulic cylinder applies axial pressure to a first thrust rod assembly which includes a first thrust rod through a threaded spindle driving a linearly translated cam. A cam follower wheel transfers the translation to a second thrust rod assembly which includes a horizontal shaft and a spindle within a cross-arm housing portion and a tubular housing portion. The same second thrust direction applies the bearing loading in either of two directions depending upon the shape of the interface parts. The interface parts can bear on the bearing from either side with respect to the bearing mounting structural part. NASA




**N83-29708*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**CENTRIFUGAL-RECIPROCATING COMPRESSOR Patent Application**
W. H. HIGA, *inventor (to NASA)* 23 Jul. 1982 27 p
(NASA-CASE-NPO-14597-2; US-PATENT-APPL-SN-401288)
Avail: NTIS HC A03/MF A01 CSCL 13I

A centrifugal compressor includes at least one pair of cylinders arranged in coaxial alignment and supported for angular displacement about a common axis of rotation normally bisecting a common longitudinal axis of symmetry for the cylinders. The cylinders are characterized by ported closures located at the mutually remote ends thereof through which the cylinders are charged and discharged, and a pair of piston heads seated within

the cylinders and supported for floating displacement in compressive strokes in response to unidirectional angular displacement imparted to the cylinders. Author

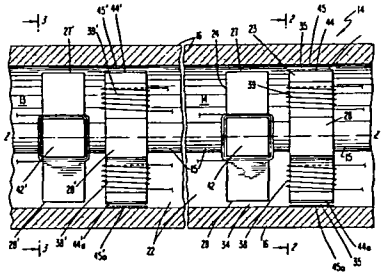



**N83-31019*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**VARIABLE LENGTH STRUT WITH LONGITUDINAL COMPLIANCE AND LOCKING CAPABILITY Patent Application**
R. R. BELEW, inventor (to NASA) 1 Jul. 1983 15 p
(NASA-CASE-MFS-25907-1; US-PATENT-APPL-SN-510137)
Avail: NTIS HC A02/MF A01 CSCL 13I

A variable length strut device is disclosed for connecting two associated structures which includes an outer load bearing shell, a drive assembly, a length varying compliance assembly positioned by a drive assembly, and a strut rod locking assembly. The load bearing shell includes a connecting part adapted for connection to a one associated structure. A strut connection rod has a connecting part adapted for connection to a another associated structure and a distal end with a piston driver slidably carried in a housing. Two pistons act in opposing directions on the piston driver to provide longitudinal compliance in a compliance mode of operation. The locking assembly includes locking balls which are urged in a locking ring where locking bolt is urged to the left by fluid pressure. Microswitches sense the displacement of pistons away from the internal ring to bring the pistons to a neutral position in which the pistons are in contact with the internal ring when it is desired to do so as effected by a control source. NASA

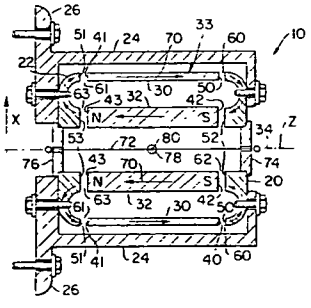
**N83-32067*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**LINEAR MAGNETIC BEARING Patent**
P. A. STUDER, inventor (to NASA) 14 Jun. 1983 15 p Filed 8 Dec. 1980 Supersedes N81-22279 (19 - 13, p 1752)
(NASA-CASE-GSC-12517-1; US-PATENT-4,387,935;
US-PATENT-APPL-SN-214361; US-PATENT-CLASS-308-10;
US-PATENT-CLASS-104-282; US-PATENT-CLASS-104-290;
US-PATENT-CLASS-310-12) Avail: US Patent and Trademark Office CSCL 13I

A linear magnetic bearing system having electromagnetic vernier flux paths in shunt relation with permanent magnets, so that the vernier flux does not traverse the permanent magnet, is described. Novelty is believed to reside in providing a linear magnetic bearing having electromagnetic flux paths that bypass high reluctance permanent magnets. Particular novelty is believed to reside in providing a linear magnetic bearing with a pair of axially spaced elements having electromagnets for establishing vernier x and y axis control. The magnetic bearing system has possible use in connection with a long life reciprocating cryogenic refrigerator that may be used on the space shuttle. J.D.H.



**N83-34323*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**MAGNETIC BEARING AND MOTOR Patent**
P. A. STUDER, inventor (to NASA) 3 May 1983 8 p Filed 31 Mar. 1982 Supersedes N82-29603 (20 - 20, p 2832)
(NASA-CASE-GSC-12726-1; US-PATENT-4,381,375;
US-PATENT-APPL-SN-364093; US-PATENT-CLASS-308-10)
Avail: US Patent and Trademark Office CSCL 13I

A magnetic bearing for passively suspending a rotatable element subjected to axial and radial thrust forces is disclosed. The magnetic bearing employs a taut wire stretched along the longitudinal axis of the bearing between opposed end pieces and an intermediate magnetic section. The intermediate section is segmented to provide oppositely directed magnetic flux paths between the end pieces and may include either an axially polarized magnets interposed between the segments. The end pieces, separated from the intermediate section by air gaps, control distribution of magnetic flux between the intermediate section segments. Coaxial alignment of the end pieces with the intermediate section minimizes magnetic reluctance in the flux paths endowing the bearing with self-centering characteristics when subjected to radial loads. In an alternative embodiment, pairs of oppositely wound armature coils are concentrically interposed between segments of the intermediate section in concentric arcs adjacent to radially polarized magnets to equip a magnetic bearing as a torsion drive motor. The magnetic suspension bearing disclosed provides long term reliability without maintenance with application to long term space missions such as the VISSR/VAS scanning mirror instrument in the GOES program. J.M.S.



**N83-36482*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APPARATUS FOR ACCURATELY PRELOADING AUGER ATTACHMENT MEANS FOR FRANGIBLE PROTECTIVE MATERIAL Patent**
A. M. LOVELACE (Rockwell International Corp., Downey, Calif.) and K. E. WOOD, inventors (to NASA) (Rockwell International Corp., Downey, Calif.) 4 Oct. 1983 6 p Filed 30 Mar. 1981 Supersedes N81-24446 (19 - 15, p 2063) Sponsored by NASA
(NASA-CASE-MSC-18791-1; US-PATENT-4,407,165; US-PATENT-APPL-SN-248746; US-PATENT-CLASS-73-862.54; US-PATENT-CLASS-29-446; US-PATENT-CLASS-81-55; US-PATENT-CLASS-81-57.38) Avail: US Patent and Trademark Office CSCL 09I

Apparatus for preloading a spring loaded threaded member is described. The apparatus is formed of three telescoping tubes. The innermost tube has means to prevent rotation of the threaded member. The middle tube is threadedly engaged with the threaded member and by axial movement applies a preload thereto. The outer tube engages a nut which may be rotated to retain the threaded member in axial position to maintain the preload.

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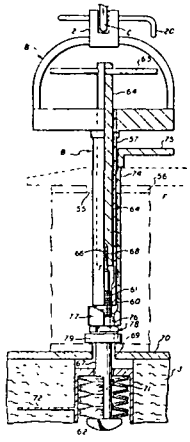

**N83-36483*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**AUTOMATIC COMPRESSION ADJUSTING MECHANISM FOR INTERNAL COMBUSTION ENGINES Patent**
J. W. AKKERMAN, inventor (to NASA) 27 Sep. 1983 8 p Filed 22 May 1981 Supersedes N81-29442 (19 - 20, p 2773)
(NASA-CASE-MSC-18807-1; US-PATENT-4,406,256; US-PATENT-APPL-SN-266688; US-PATENT-CLASS-123-78E; US-PATENT-CLASS-123-197R) Avail: US Patent and Trademark Office CSCL 21G

Means for controlling the compression pressure in an internal combustion engine having one or more cylinders and subject to widely varying power output requirements are provided. Received between each crank pin and connecting rod is an eccentric sleeve selectively capable of rotation about the crank pin and/or inside the rod and for latching with the rod 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 carried by the eccentric is movable radially outwardly to latch the rod and eccentric together during the compression and power strokes. A control valve responds to intake manifold pressure to time the supply of hydraulic fluid to move the latch-pawl outwardly, varying the effective rod length to maintain a substantially optimum firing chamber pressure at all intake manifold pressures.

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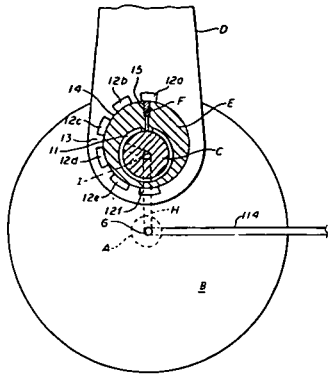
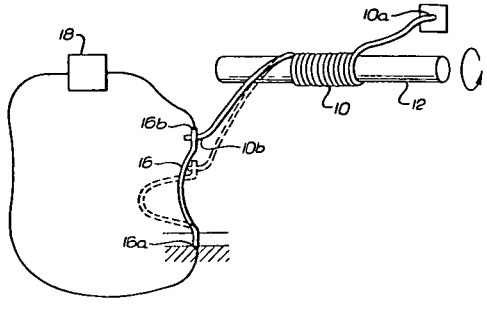


**N83-36484*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**ROTARY STEPPING DEVICE WITH MEMORY METAL ACTUATOR Patent Application**
R. S. JAMIESON, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 15 Jul. 1983 12 p
(Contract NAS7-100)
(NASA-CASE-NPO-15482-1; US-PATENT-APPL-SN-526739)
Avail: NTIS HC A02/MF A01 CSCL 13I

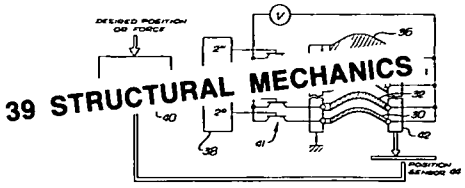
A rotary stepping device includes a rotatable shaft which is driven by means of a coiled spring clutch which is alternately tightened to grip and rotate the shaft and released to return it to a resting position. An actuator formed of a memroy metal is used to pull the spring clutch to tighten it and rotate the shaft. The actuator is activated by heating it above its critical temperature and is returned to an elongated configuration by means of the force of the spring cloth. NASA



**N83-36485*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**MEMORY METAL ACTUATOR Patent Application**
C. F. RUOFF, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Aug. 1983 17 p
(Contract NAS7-100)
(NASA-CASE-NPO-15960-1; NASA-CASE-NPO-16120-1; US-PATENT-APPL-SN-527613) Avail: NTIS HC A02/MF A01 CSCL 13I

A mechanical actuator can be constructed by employing a plurality of memory metal actuator elements in parallel to control the amount of actuating force. In order to facilitate direct control by digital control signals provided by a computer or the like, the actuating elements may vary in stiffness according to a binary

relationship. The cooling or reset time of the actuator elements can be reduced by employing Peltier junction cooling assemblies in the actuator. NASA




# 39 STRUCTURAL MECHANICS

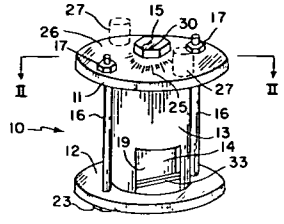
Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

**N83-32081*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**FIXTURE FOR ENVIRONMENTAL EXPOSURE OF STRUCTURAL MATERIALS UNDER COMPRESSION LOAD Patent**
R. K. CLARK and W. B. LISAGOR, inventors (to NASA) 19 Jul. 1983 4 p Filed 26 Nov. 1980 Supersedes N81-19429 (19 - 10, p 1350)
(NASA-CASE-LAR-12602-1; US-PATENT-4,393,716; US-PATENT-APPL-SN-210506; US-PATENT-CLASS-73-818; US-PATENT-CLASS-73-822; US-PATENT-CLASS-73-856; US-PATENT-CLASS-73-860; US-PATENT-CLASS-374-51) Avail: US Patent and Trademark Office CSCL 20K

A device for stressing a deformable material specimen consists of top plate and a bottom plate sandwiching a guide cylinder. The specimen is positioned on the bottom plate and attached to a load piston. Force is applied through the top plate into the guide cylinder. Once the specimen is loaded, the stress is maintained by tightening tie bolt nuts.

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



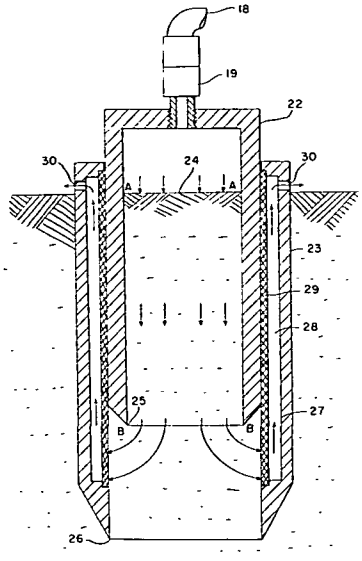

# 43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

**N83-29783*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**FLOW RESISTIVITY INSTRUMENT Patent Application**
A. J. ZUCKERWAR, inventor (to NASA) 27 Jun. 1983 10 p
(NASA-CASE-LAR-13053-1; US-PATENT-APPL-SN-508372)
Avail: NTIS HC A02/MF A01 CSCL 08H

A method and apparatus for making in-situ measurements of flow resistivity on the Earth's ground surface is summarized. The novel feature of the invention is two concentric cylinders, inserted into the ground surface with a measured pressure applied to the surface inside the inner cylinder. The outer cylinder vents a plane beneath the surface to the atmosphere through an air space. The flow to the inner cylinder is measured thereby indicating the flow from the surface to the plane beneath the surface. NASA




# 44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

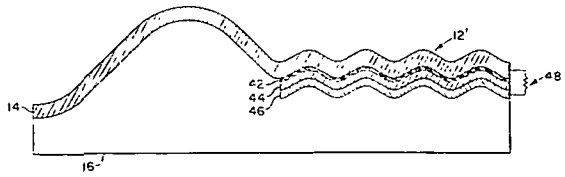
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

**N83-26258*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**SOLAR ENERGY CONVERTER USING SURFACE PLASMA WAVES Patent Application**
L. M. ANDERSON, inventor (to NASA) 19 Apr. 1983 14 p
(NASA-CASE-LEW-13827-1; US-PATENT-APPL-SN-486470)
Avail: NTIS HC A02/MF A01 CSCL 10A

Sunlight is dispersed over a diffraction grating formed on the surface of a conducting film on a substrate. The angular dispersion controls the effective grating period so that a marching spectrum of surface plasmons is excited for parallel processing on the conducting film. The resulting surface plasmons carry energy to an array of inelastic tunnel diodes. This solar energy converter

does not require different materials for each frequency band, and sunlight is directly converted to electricity in an efficient manner by extracting more energy from the more energetic photons.

NASA




**N83-27344*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**ZIRCONIUM CARBIDE AS AN ELECTROCATALYST FOR THE CHROMOUS-CHROMIC REDOX COUPLE Patent**

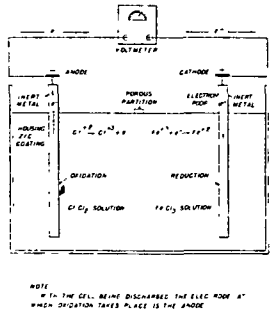
R. F. GAHN, M. A. REID, and C. Y. YANG, inventors (to NASA) 22 May 1981 8 p Filed 22 May 1981 Supersedes N81-26203 (19 - 18, p 2506)

(NASA-CASE-LEW-13246-1; US-PATENT-4,382,116; US-PATENT-APPL-SN-266255; US-PATENT-CLASS-429-34; US-PATENT-CLASS-429-40; US-PATENT-CLASS-429-105; US-PATENT-CLASS-429-107; US-PATENT-CLASS-429-109)

Avail: US Patent and Trademark Office CSCL 10C

Zirconium carbide is used as a catalyst in a REDOX cell for the oxidation of chromous ions to chromic ions and for the reduction of chromic ions to chromous ions. The zirconium carbide is coated on an inert electronically conductive electrode which is present in the anode fluid of the cell.

Official Gazette, U.S. Patent and Trademark Office




**N83-28573*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**SOLAR DRIVEN LIQUID METAL MHD POWER GENERATOR Patent**

J. H. LEE (Vanderbilt Univ., Nashville, Tenn.) and F. HOHL, inventors (to NASA) (Vanderbilt Univ., Nashville) 14 Jun. 1983 7 p Filed 15 May 1981 Supersedes N81-32609 (19 - 23, p 3215) Sponsored by NASA

(NASA-CASE-LAR-12495-1; US-PATENT-4,388,542; US-PATENT-APPL-SN-263830; US-PATENT-CLASS-310-11)

Avail: US Patent and Trademark Office CSCL 10A

A solar energy collector focuses solar energy onto a solar oven which is attached to a mixer which in turn is attached to the channel of a MHD generator. Gas enters the oven and a liquid metal enters the mixer. The gas/liquid metal mixture is heated by the collected solar energy and moves through the MHD generator thereby generating electrical power. The mixture is then separated and recycled.

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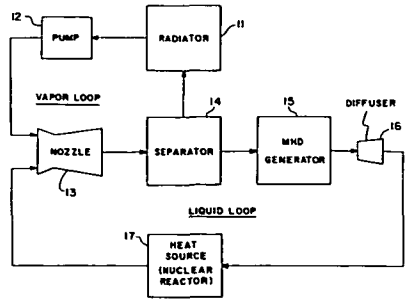


**N83-28574*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**STIRLING CYCLE CRYOGENIC COOLER Patent**

M. G. GASSER, A. SHERMAN, P. A. STUDER, A. DANIELS, and M. P. GOLDOWSKY, inventors (to NASA) 28 Jun. 1983 14 p Filed 2 Oct. 1981 Supersedes N80-26571 (18 - 17, p 2261)

(NASA-CASE-LAR-12697-1; US-PATENT-4,389,849; US-PATENT-APPL-SN-308204; US-PATENT-CLASS-62-6; US-PATENT-CLASS-308-10; US-PATENT-CLASS-310-15; US-PATENT-CLASS-417-417) Avail: US Patent and Trademark Office CSCL 10B

A long lifetime Stirling cycle cryogenic cooler particularly adapted for space applications is described. It consists of a compressor section centrally aligned end to end with an expansion section, and respectively includes a reciprocating compressor piston and displacer radially suspended in interconnecting cylindrical housings by active magnetic bearings and has adjacent reduced clearance regions so as to be in noncontacting relationship therewith and wherein one or more of these regions operate as clearance seals. The piston and displacer are reciprocated in their housings by linear drive motors to vary the volume of respectively adjacent compression and expansion spaces which contain a gaseous working fluid and a thermal regenerator to effect Stirling cycle cryogenic cooling.

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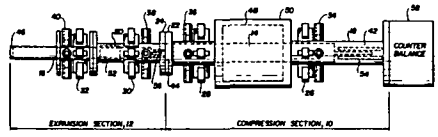



**N83-29804*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**HIGH THERMAL POWER DENSITY HEAT TRANSFER APPARATUS PROVIDING ELECTRICAL ISOLATION AT HIGH TEMPERATURE USING HEAT PIPES Patent Application**

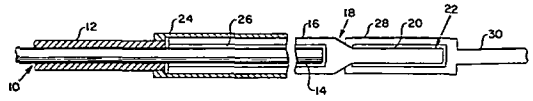
J. F. MORRIS, inventor (to NASA) 24 Jun. 1983 10 p

(NASA-CASE-LEW-12950-2; US-PATENT-APPL-SN-507626)

Avail: NTIS HC A02/MF A01 CSCL 10A

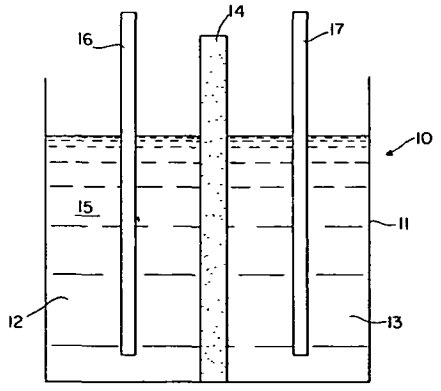
This invention is directed to transferring heat from an extremely high temperature source to an electrically isolated lower temperature receiver. The invention is particularly concerned with supplying thermal power to a thermionic converter from a nuclear reactor with electric isolation. Heat from a high temperature heat pipe is transferred through a vacuum or a gap filled with electrically nonconducting gas to a cooler heat pipe. The heat pipe is used to cool the nuclear reactor while the heat pipe is connected

thermally and electrically to a thermionic converter. If the receiver requires greater thermal power density, geometries are used with larger heat pipe areas for transmitting and receiving energy than the area for conducting the heat to the thermionic converter. In this way the heat pipe capability for increasing thermal power densities compensates for the comparatively low thermal power densities through the electrically nonconducting gap between the two heat pipes. NASA




**N83-29805*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**POLYVINYL ALCOHOL BATTERY SEPARATOR CONTAINING INERT FILLER Patent Application**
D. W. SHEIBLEY, L. C. HSU, and M. A. MANZO, inventors (to NASA) 3 Feb. 1983 13 p
(NASA-CASE-LEW-13556-2; US-PATENT-APPL-SN-463440)
Avail: NTIS HC A02/MF A01 CSCL 10C

A cross-linked polyvinyl alcohol battery separator is described. A particulate filler, inert to the alkaline electrolyte of an alkaline battery, is incorporated in the sepatator in an amount of 1 to 20% by weight, based on the weight of the polyvinyl alcohol, and is dispersed throughout the product. Incorportion of the filler enhances performance and increases cycle life of alkaline batteries when compared with batteries containing a similar separator not containing filler. Suitable fillers include titanates, silicates, zirconates, aluminates, wood flour, lignin, and titania. Particle size is not greater than about 50 microns. NASA




**N83-29806*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**PRODUCTION OF BUTANOL BY FERMENTATION IN THE PRESENCE OF CO-CULTURE OF CLOSTRIDIUM Patent Application**
S. L. BERGSTROM (JPL, California Inst. of Tech., Pasadena) and G. L. FOUTCH, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 10 May 1983 10 p
(Contract NAS7-100)
(NASA-CASE-NPO-16203-1; US-PATENT-APPL-SN-493179)
Avail: NTIS HC A02/MF A01 CSCL 10A

Sugars are converted to a mixture of solvents including butanol by a fermentation process employing a co-culture 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 co-culture substantially increases the yield of butanol over that obtained using a culture employing only one microorganism. NASA

**N83-32175*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**THERMIONIC ENERGY CONVERTERS Patent**
J. F. MORRIS, inventor (to NASA) 8 Dec. 1983 6 p Filed 19 Feb. 1981 Supersedes N81-19561 (19 - 10, p 1368)
(NASA-CASE-LEW-12443-1; US-PATENT-4,373,142; US-PATENT-APPL-SN-235797; US-PATENT-CLASS-310-306)
Avail: US Patent and Trademark Office CSCL 10A

The efficiency of thermionic energy converters is improved by internal distribution of tiny sorted cesium diodes driven by the thermal gradient between the primary emitter and the collector. The tiny, sorted diode distribution comprises protrusions of the emitter material from the main emitter face which contact the main collector face thermally but not electrically. The main collector ends of the protrusions are separated from the main collector by a thin layer of insulation, such as aluminum oxide. The shorted tiny diode distribution augments cesium ionization through internal thermal effects only within the main diode. No electrical inputs are required. This ionization enhancement by the distribution of the tiny shorted diodes not only reduces the plasma voltage drop but also increases the power output and efficiency of the overall thermionic energy converter.

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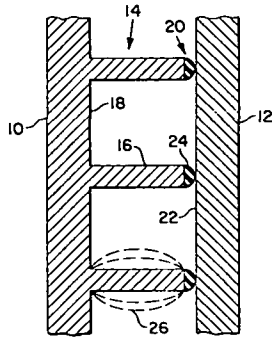


**N83-32176*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**ADVANCED INORGANIC SEPARATORS FOR ALKALINE BATTERIES AND METHOD OF MAKING THE SAME Patent**
D. W. SHEIBLEY, inventor (to NASA) 1 Feb. 1983 5 p Filed 22 Dec. 1981
(NASA-CASE-LEW-13171-2; US-PATENT-4,371,596; US-PATENT-APPL-SN-333537; US-PATENT-CLASS-429-144; US-PATENT-CLASS-429-251; US-PATENT-CLASS-429-254; US-PATENT-CLASS-29-623.5) Avail: US Patent and Trademark Office CSCL 10C

A flexible, porous battery separator includes a coating applied to a porous, flexible substrate. The coating comprises: (1) a thermoplastic rubber-based resin which is insoluble and unreactive in the alkaline electrolyte, (2) a polar organic plasticizer which is reactive with the alkaline electrolyte to produce a reaction product which contains a hydroxyl group and/or a carboxylic acid group, and (3) a mixture of polar particulate filler materials which are

unreactive with the electrode. The mixture comprises at least one first filler material having a surface area of greater than 25 sq meters/gram, at last one second filler material having a surface area of 10 to 25 sq meters/gram. 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 sq meters/gram, and the amount of plasticizer is sufficient to coat each filler particle.

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**N83-32177*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**HIGH VOLTAGE V-GROOVE SOLAR CELL Patent**

J. C. EVANS, JR., A. T. CHAI, and C. P. GORADIA, inventors (to NASA) 15 Mar. 1983 6 p Filed 18 Mar. 1982 Supersedes N82-24717 (20 - 15, p 2122)

(NASA-CASE-LEW-13401-2; US-PATENT-4,376,872; US-PATENT-APPL-SN-359388; US-PATENT-CLASS-136-249; US-PATENT-CLASS-357-30) Avail: US Patent and Trademark Office CSCL 10A

A high voltage multijunction solar cell comprises a number of discrete voltage generating regions, or unit cells, which are formed in a single semiconductor wafer and are connected together so that the voltages of the individual cells are additive. The unit cells comprise doped regions of opposite conductivity types separated by a gap. The method includes forming V-shaped grooves in the wafer and orienting the wafer so that ions of one conductivity type can be implanted in one face of the groove while the other face is shielded. A metallization layer is applied and selectively etched away to provide connections between the unit cells.

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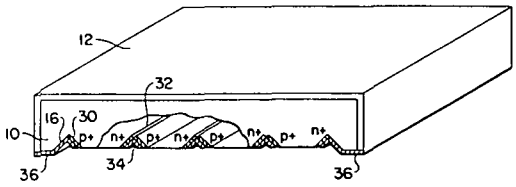


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**N83-34448*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**HIGH TEMPERATURE GLASS THERMAL CONTROL STRUCTURE AND COATING Patent**

D. A. STEWART (Stanford Univ.), H. E. GOLDSTEIN (Stanford Univ.), and D. B. LEISER, inventors (to NASA) (Stanford Univ.) 26 Apr. 1983 6 p Filed 2 Oct. 1981 Supersedes N82-10228 (20 - 01, p 0035) Sponsored by NASA

(NASA-CASE-ARC-11164-1; US-PATENT-4,381,333; US-PATENT-APPL-SN-308007; US-PATENT-CLASS-428-312.6; US-PATENT-CLASS-350-166; US-PATENT-CLASS-428-325; US-PATENT-CLASS-428-428; US-PATENT-CLASS-428-427) Avail: US Patent and Trademark Office CSCL 10A

A high temperature stable and solar radiation stable thermal control coating is described which is useful either as such, applied directly to a member to be protected, or applied as a coating on a re-usable surface insulation (RSI). It has a base coat layer and an overlay glass layer. The base coat layer has a high emittance, and the overlay layer is formed from discrete, but sintered together glass particles to give the overlay layer a high scattering coefficient. The resulting two-layer space and thermal control coating has an absorptivity-to-emissivity ratio of less than or equal to 0.4 at room temperature, with an emittance of 0.8 at 1200 F. It is capable of exposure to either solar radiation or temperatures as high as 2000 F without significant degradation. When used as a coating on a silica substrate to give an RSI structure, the coatings of this invention show significantly less reduction in emittance after long term convective heating and less residual strain than prior art coatings for RSI structures.

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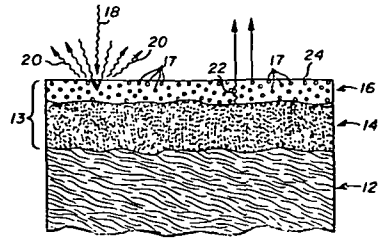


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**N83-34449*** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**VARIABLE ANODIC THERMAL CONTROL COATING Patent**

C. S. GILLILAND and J. DUCKETT, inventors (to NASA) 9 Aug. 1983 8 p Filed 9 Apr. 1982 Supersedes N82-31508 (20 - 22, p 3111)

(NASA-CASE-LAR-12719-1; US-PATENT-4,397,716; US-PATENT-APPL-SN-367134; US-PATENT-CLASS-204-33; US-PATENT-CLASS-204-35N; US-PATENT-CLASS-126-901) Avail: US Patent and Trademark Office CSCL 10A

A process for providing a thermal control solar stable surface coating for aluminum surfaces adapted to be exposed to solar radiation wherein selected values within the range of 0.10 to 0.72 thermal emittance (epsilon sub tau) and 0.2 to 0.4 solar absorptance (alpha subs) are reproducibly obtained by anodizing the surface area in a chromic acid solution for a selected period of time. The rate voltage and time, along with the parameters of initial epsilon sub tau and alpha subs, temperature of the chromic acid solution, acid concentration of the solution and the material anodized determines the final values of epsilon/tau sub and alpha sub S. 9 Claims, 5 Drawing Figures.

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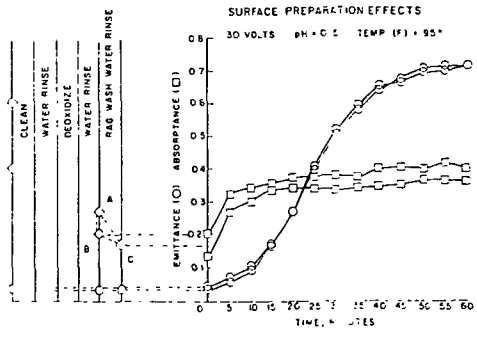


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# 45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

**N83-25217*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**MOBILE SAMPLER FOR USE IN ACQUIRING SAMPLES OF**

**TERRESTRIAL ATMOSPHERIC GASES Patent**
C. E. TUCKER (JPL, California Inst. of Tech., Pasadena) and H. P. HOLWAY, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 23 Mar. 1981 7 p Filed 23 Mar. 1981 Supersedes N81-24414 (19 - 15, p 2059)
(NASA-CASE-NPO-15220-1; US-PATENT-4,377,949; US-PATENT-APPL-SN-246777; US-PATENT-CLASS-73-863.31; US-PATENT-CLASS-73-863.83; US-PATENT-CLASS-73-864.63; US-PATENT-CLASS-220-335) Avail: US Patent and Trademark Office CSCL 13B

Samples of terrestrial atmospheric gasses from a free body of such gasses using a device characterized by a plurality of tubular bodies adapted to be mounted in side by side relation on a motorized highway vehicle in mutual parallelism with the axis of the normal path of travel for the vehicles. Each of the bodies is of a cylindrical configuration and has an axial opening at each of its opposite ends through which a linear flow path is defined. A pair of pivotally supported, spring-biased sealing caps is mounted adjacent to the ends of the body and continuously urged into a hermetic sealing relationship. A restraint for securing the caps against spring-urged pivotal displacement, includes a separable, normally tensioned line interconnecting the caps and an operable release mechanism for simultaneously releasing the caps for spring-urged displacement. A hot wire cutter is included for separating the line, whereby samples of air are trapped in the body as the caps are spring-driven to assume an hermetically sealed relation with the openings defined in each of the opposite ends of the body.

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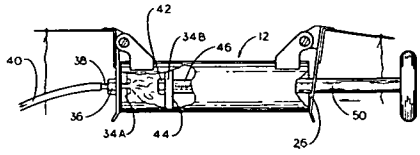


# 47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

**N83-32232*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**CLOUD COVER SENSOR Patent**
E. G. LAUE, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Oct. 1982 5 p Filed 27 Jun. 1980 Supersedes N80-26992 (18 - 17, p 2318)
(NASA-CASE-NPO-14936-1; US-PATENT-4,355,896; US-PATENT-APPL-SN-163837; US-PATENT-CLASS-356-222; US-PATENT-CLASS-250-203R) Avail: US Patent and Trademark Office CSCL 04B

An apparatus is described which provides a numerical indication of the cloudiness at a particular time of a day. The apparatus includes a frame holding several light sensors such as photovoltaic cells, with a direct sensor mounted to directly face the Sun and indirect sensors mounted to face different portions of the sky not containing the Sun. A light shield shields the direct sensor from most of the sky except a small portion containing the Sun, and also shields each of the indirect sensors from direct sunlight. The relative values of the outputs from the direct and indirect sensors, enables the generation of a numerical indication of the degree of cloudiness at a particular time of day.

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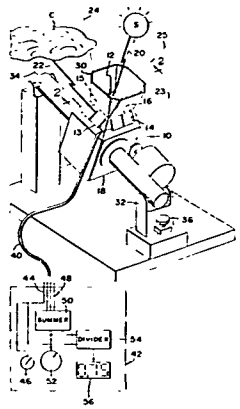

# 51 LIFE SCIENCES (GENERAL)

Includes genetics.

**N83-27569*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**RAPID, QUANTITATIVE DETERMINATION OF BACTERIA IN WATER Patent**
E. W. CHAPPELLE, G. L. PICCIOLO (Hahnemann Hospital, Philadelphia, Pa.), R. R. THOMAS (Boeing Co., Houston, Tex.), E. L. JEFFERS (Boeing Co., Houston, Tex.), and J. W. DEMING, inventors (to NASA) (Hahnemann Hospital, Philadelphia, Pa.) 20 Mar. 1978 18 p Filed 20 Mar. 1978 Supersedes N78-22585 (16 - 13, p 1734)
(NASA-CASE-GSC-12158-1; US-PATENT-4,385,113; US-PATENT-APPL-SN-888434; US-PATENT-CLASS-435-8; US-PATENT-CLASS-422-52; US-PATENT-CLASS-435-3; US-PATENT-CLASS-435-34; US-PATENT-CLASS-435-38; US-PATENT-CLASS-435-39; US-PATENT-CLASS-435-289; US-PATENT-CLASS-435-291) Avail: US Patent and Trademark Office CSCL 06C

A bioluminescent assay for ATP in water borne bacteria is made by adding nitric acid to a water sample with concentrated bacteria to rupture the bacterial cells. The sample is diluted with sterile, deionized water, then mixed with a luciferase-luciferin mixture and the resulting light output of the bioluminescent reaction is measured and correlated with bacteria present. A standard and a blank also are presented so that the light output can be correlated to bacteria in the sample and system noise can be substracted from the readings. A chemiluminescent assay for iron porphyrins in water borne bacteria is made by adding luminol reagent to a water sample with concentrated bacteria and measuring the resulting light output of the chemiluminescent reaction.

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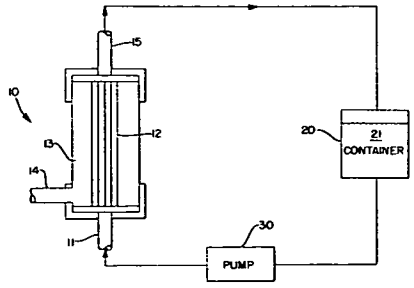

**N83-28849*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**METHOD FOR DETECTING COLIFORM ORGANISMS Patent**
K. NISHIOKA (Boeing Co., Palo Alto, Calif.), D. A. NIBLEY (Boeing Co., Palo Alto, Calif.), E. L. JEFFERS (Boeing Co., Palo Alto, Calif.), and R. L. BROOKS, inventors (to NASA) (Boeing Co., Palo Alto, Calif.) 31 May 1983 10 p Filed 26 Oct. 1981 Supersedes N82-12739 (20 - 03, p 0386) Sponsored by NASA
(NASA-CASE-ARC-11322-1; US-PATENT-4,386,157; US-PATENT-APPL-SN-315278; US-PATENT-CLASS-435-39; US-PATENT-CLASS-435-3; US-PATENT-CLASS-435-34; US-PATENT-CLASS-435-38; US-PATENT-CLASS-435-807)
Avail: US Patent and Trademark Office CSCL 06C

A method and apparatus are disclosed for determining the concentration of coliform bacteria in a sample. The sample containing the coliform bacteria is cultured in a liquid growth medium. The cultured bacteria produce hydrogen and the hydrogen is vented to a second cell containing a buffer solution in which the hydrogen dissolves. By measuring the potential change in the buffer solution caused by the hydrogen, as a function of time, the initial concentration of bacteria in the sample is determined. Alternatively, the potential change in the buffer solution can be compared with the potential change in the liquid growth medium to verify that the potential change in the liquid growth medium is produced primarily by the hydrogen gas produced by the coliform bacteria.

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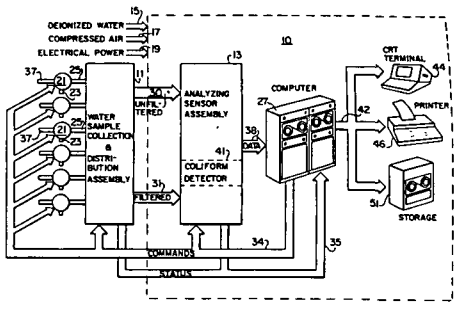


# 52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

**N83-25346*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**SYSTEM AND METHOD FOR MOVING A PROBE TO FOLLOW MOVEMENTS OF TISSUE Patent**
C. FELDSTEIN (JPL, California Inst. of Tech., Pasadena), T. W. ANDREWS (JPL, California Inst. of Tech., Pasadena), D. W. CRAWFORD (JPL, California Inst. of Tech., Pasadena), and M. A. COLE, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 15 May 1981 6 p Filed 15 May 1981 Supersedes N81-26697 (19 - 17, p 2379)
(NASA-CASE-NPO-15197-1; US-PATENT-4,378,813; US-PATENT-APPL-SN-263957; US-PATENT-CLASS-128-774; US-PATENT-CLASS-128-782; US-PATENT-CLASS-128-303B)
Avail: US Patent and Trademark Office CSCL 06B

An apparatus is described for moving a probe that engages moving living tissue such as a heart or an artery that is penetrated by the probe, which moves the probe in synchronism with the tissue to maintain the probe at a constant location with respect to the tissue. The apparatus includes a servo positioner which moves a servo member to maintain a constant distance from a sensed object while applying very little force to the sensed object, and a follower having a stirrup at one end resting on a surface of the living tissue and another end carrying a sensed object adjacent to the servo member. A probe holder has one end mounted on the servo member and another end which holds the probe.

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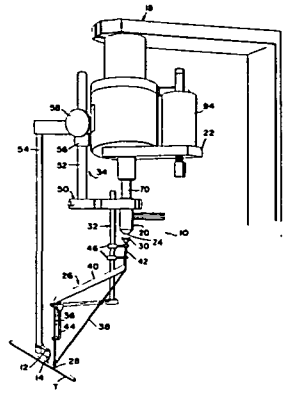

**N83-27577*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**BIO-MEDICAL FLOW SENSOR Patent**
H. E. WINKLER, inventor (to NASA) 16 Apr. 1981 6 p Filed 16 Apr. 1981 Supersedes N81-24717 (19 - 15, p 2101)
(NASA-CASE-MSC-18761-1; US-PATENT-4,384,578; US-PATENT-APPL-SN-254688; US-PATENT-CLASS-604-114; US-PATENT-CLASS-73-204; US-PATENT-CLASS-128-DIG.13; US-PATENT-CLASS-604-151) Avail: US Patent and Trademark Office CSCL 06B

A bio-medical flow sensor including a packageable unit of a bottle, tubing and hypodermic needle which can be pre-sterilized and is disposable. The tubing has spaced apart tubular metal segments. The temperature of the metal segments and fluid flow therein is sensed by thermistors and at a downstream location heat is input by a resistor to the metal segment by a control electronics. The fluids flow and the electrical power required for the resisto to maintain a constant temperature differential between the tubular metal segments is a measurable function of fluid flow through the tubing. The differential temperature measurement is made in a control electronics and also can be used to control a flow control valve or pump on the tubing to maintain a constant flow in the tubing and to shut off the tubing when air is present in the tubing.

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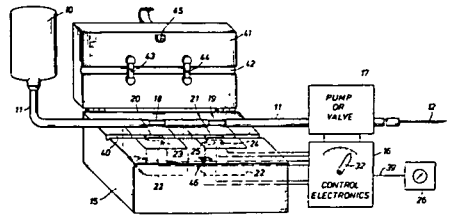
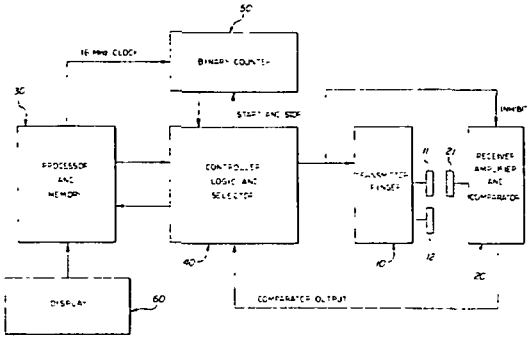



**N83-27578*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APPARATUS FOR DETERMINING CHANGES IN LIMB VOLUME Patent**

P. K. BHAGAT (Kentucky Univ., Lexington) and V. C. WU, inventors (to NASA) (Kentucky Univ., Lexington) 10 Feb. 1981 7 p Filed 10 Feb. 1981 Supersedes N81-24716 (19 - 15, p 2101) Sponsored by NASA
(NASA-CASE-MSC-18759-1; US-PATENT-4,383,533; US-PATENT-APPL-SN-233270; US-PATENT-CLASS-128-660; US-PATENT-CLASS-128-663; US-PATENT-CLASS-73-597)
Avail: US Patent and Trademark Office CSCL 06P

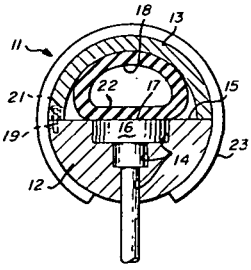
Measuring apparatus for determining changes in the volume of limbs or other boty extremities by determining the cross-sectional area of such limbs many comprise a transmitter including first and second transducers for positioning on the surface of the limb at a predetermined distance there between, and a receiver including a receiver crystal for positioning on the surface of the limb. The distance between the receiver crystal and the first and second transducers are represented by respective first and second chords of the cross-section of the limb and the predetermined distance between the first and second transducers is represented by a third chord of the limb cross section.

Official Gazette of the US Patent and Trademark Office



**N83-29991*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**NON-INVASIVE METHOD AND APPARATUS FOR MEASURING PRESSURE WITHIN A PLIABLE VESSEL Patent Application**
M. SHIMIZU, inventor (to NASA) (NAS-NRC) 10 Feb. 1983 14 p Sponsored by NASA
(NASA-CASE-ARC-11264-2; US-PATENT-APPL-SN-465370)
Avail: NTIS HC A02/MF A01 CSCL 06B

A non-invasive method and apparatus is disclosed for measuring pressure within a pliable vessel such as a blood vessel. The blood vessel is clamped by means of a clamping structure having a first portion housing a pressure sensor and a second portion extending over the remote side of the blood vessel for pressing the blood vessel into engagement with the pressure sensing device. The pressure sensing device includes a flat deflectable diaphragm portion arranged to engage a portion of the blood vessel flattened against the diaphragm by means of the clamp structure. In one embodiment, the clamp structure includes first and second semicylindrical members held together by retaining rings. In a second embodiment the clamp structure is of one piece construction having a solid semicylindrical portion and a hollow semicylindrical portion with a longitudinal slot in the follow semicylindrical portion through which a slip the blood vessel. In a third embodiment, an elastic strap is employed for clamping the blood vessel against the pressure sensing device. NASA




# 60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

**N83-25378*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**MASSIVELY PARALLEL PROCESSOR COMPUTER Patent**
L. W. FUNG, inventor (to NASA) (NAS-NRC, Washington, D.C.) 12 Apr. 1983 15 p Filed 21 May 1979 Supersedes N79-27864 (17 - 18, p 2462)
(NASA-CASE-GSC-12223-1; US-PATENT-4,380,046; US-PATENT-APPL-SN-041143; US-PATENT-CLASS-364-200)
Avail: US Patent and Trademark Office CSCL 09B

An apparatus for processing multidimensional data with strong spatial characteristics, such as raw image data, characterized by a large number of parallel data streams in an ordered array is described. It comprises a large number (e.g., 16,384 in a 128 x 128 array) of parallel processing elements operating simultaneously and independently on single bit slices of a corresponding array of incoming data streams under control of a single set of instructions. Each of the processing elements comprises a bidirectional data bus in communication with a register for storing single bit slices together with a random access memory unit and associated circuitry, including a binary counter/shift register device, for performing logical and arithmetical computations on the bit slices, and an I/O unit for interfacing the bidirectional data bus with the data stream source. The massively parallel processor architecture enables very high speed processing of large amounts of ordered parallel data, including spatial translation by shifting or sliding of bits vertically or horizontally to neighboring processing elements.

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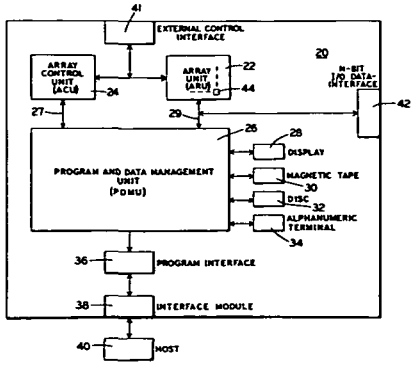

**N83-32342*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**DISTRIBUTED MULTIPORT MEMORY ARCHITECTURE Patent**
W. H. KOHL, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 19 Jul. 1983 11 p Filed 29 Apr. 1981 Supersedes N83-18290 (21 - 08, p 1246) Sponsored by NASA
(NASA-CASE-NPO-15342-1; US-PATENT-4,394,726; US-PATENT-APPL-SN-258623; US-PATENT-CLASS-364-200; US-PATENT-CLASS-364-900) Avail: US Patent and Trademark Office CSCL 09B

A multiport memory architecture is diclosed for each of a plurality of task centers connected to a command and data bus. Each task center, includes a memory and a plurality of devices which request direct memory access as needed. The memory includes an internal data bus and an internal address bus to which the devices are connected, and direct timing and control logic comprised of a 10-state ring counter for allocating memory devices by enabling AND gates connected to the request signal lines of the devices. The outputs of AND gates connected to the same device are combined by OR gates to form an acknowledgement signal that enables the devices to address the memory during the next clock period. The length of the ring counter may be effectively lengthened to any multiple of ten to allow for more direct memory access intervals in one repetitive sequence. One device is a network bus adapter which serially shifts onto the command and data bus, a data word (8 bits plus control and parity bits) during the next ten direct memory access intervals after it has been granted access. The NBA is therefore allocated only one access in every ten intervals, which is a predermined interval for all centers. The ring counters of all centers are periodically synchronized by DMA SYNC signal to assure that all NBAs be able to function in synchronism for data transfer from one center to another.

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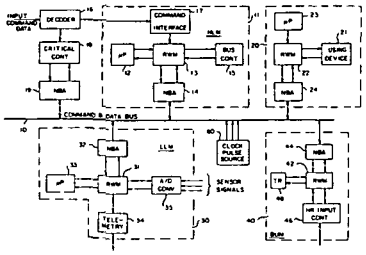
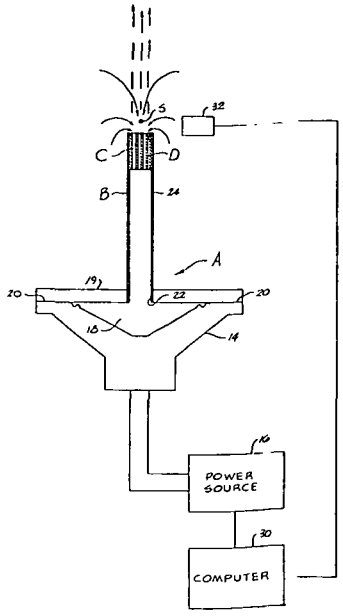


# 71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

**N83-26646*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**SONIC LEVITATION APPARATUS Patent Application**
S. A. DUNN (Bjorkstein Research Lab.), A. R. POMPLUN (Bjorksten Research Lab.), E. G. PAQUETTE (Bjorksten Research Lab.), E. C. ETHRIDGE, and J. L. JOHNSON, inventors (to NASA) 12 May 1983 18 p
(NASA-CASE-MFS-25828-1; US-PATENT-APPL-SN-493866) Avail: NTIS HC A02/MF A01 CSCL 20A

A sonic levitation apparatus is disclosed which includes a sonic transducer which generates acoustical energy responsive to the level of an electrical amplifier. A duct communicates with an acoustical chamber to deliver an oscillatory motion of air to a plenum section which contains a collimated hole structure having a plurality of parallel orifices. The collimated hole structure converts the motion of the air to a pulsed, unidirectional stream providing enough force to levitate a material specimen. Particular application to the production of microballoons in low gravity environment is discussed. NASA




**N83-32515*** National Aeronautics and Space Administration. Pasadena Office, Calif.
**ACOUSTIC SYSTEM FOR MATERIAL TRANSPORT Patent**
M. B. BARMATZ (JPL, California Inst. of Tech., Pasadena), E. H. TRINH (JPL, California Inst. of Tech., Pasadena), T. G. WANG (JPL, California Inst. of Tech., Pasadena), D. D. ELLEMAN (JPL, California Inst. of Tech., Pasadena), and N. JACOBI, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 19 Jul. 1983 8 p Filed 26 Oct. 1981 Supersedes N82-12889 (20 - 03, p 0407) Sponsored by NASA
(NASA-CASE-NPO-15453-1; US-PATENT-4,393,708; US-PATENT-APPL-SN-314929; US-PATENT-CLASS-73-505; US-PATENT-CLASS-60-721) Avail: US Patent and Trademark Office CSCL 20A

An object within a chamber is acoustically moved by applying wavelengths of different modes to the chamber to move the object between pressure wells formed by the modes. In one system, the object is placed in one end of the chamber while a resonant mode, applied along the length of the chamber, produces a pressure well at the location. The frequency is then switched to a second mode that produces a pressure well at the center of the chamber, to draw the object. When the object reaches the second pressure well and is still traveling towards the second end of the chamber, the acoustic frequency is again shifted to a third mode (which may equal the first model) that has a pressure well in the second end portion of the chamber, to draw the object. A heat source may be located near the second end of the chamber to heat the sample, and after the sample is heated it can be cooled

by moving it in a corresponding manner back to the first end of the chamber. The transducers for levitating and moving the object may be all located at the cool first end of the chamber.

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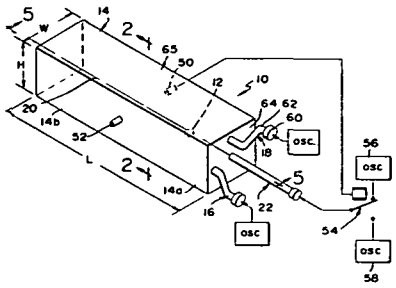


**N83-32516*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**SYSTEM FOR CONTROLLED ACOUSTIC ROTATION OF OBJECTS Patent**

M. B. BARMATZ, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 19 Jul. 1983 7 p Filed 18 Sep. 1981 Supersedes N82-11861 (20 - 02, p 0261) Sponsored by NASA (NASA-CASE-NPO-15522-1; US-PATENT-4,393,706; US-PATENT-APPL-SN-303672; US-PATENT-CLASS-73-505; US-PATENT-CLASS-60-721) Avail: US Patent and Trademark Office CSCL 20A

A system is described for use with acoustically levitated objects, which enables close control of rotation of the object. One system includes transducers that propagate acoustic waves along the three dimensions (X, Y, Z) of a chamber of rectangular cross section. Each transducers generates one wave which is resonant to a corresponding chamber dimension to acoustically levitate an object, and additional higher frequency resonant wavelengths for controlling rotation of the object. The three chamber dimensions and the corresponding three levitation modes (resonant wavelengths) are all different, to avoid degeneracy, or interference, of waves with one another, that could have an effect on object rotation. Only the higher frequencies, with pairs of them having the same wavelength, are utilized to control rotation, so that rotation is controlled independently of levitation and about any arbitrarily chosen axis.

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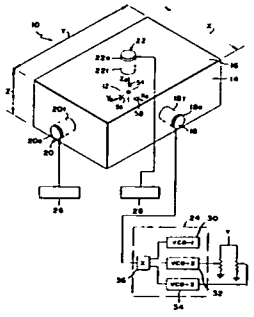
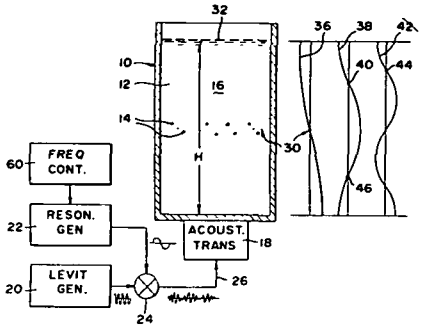


**N83-35781*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**ACOUSTIC BUBBLE REMOVAL METHOD Patent**

E. H. TRINH (JPL, California Inst. of Tech., Pasadena), D. D. ELLEMAN (JPL, California Inst. of Tech., Pasadena), and T. G. WANG, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 16 Aug. 1983 5 p Filed 21 Jan. 1982 Supersedes N82-22497 (20 - 13, p 1797) Sponsored by NASA (NASA-CASE-NPO-15334-1; US-PATENT-4,398,925; US-PATENT-APPL-SN-341406; US-PATENT-CLASS-55-15; US-PATENT-CLASS-55-38; US-PATENT-CLASS-55-52; US-PATENT-CLASS-55-277; US-PATENT-CLASS-65-134; US-PATENT-CLASS-366-114; US-PATENT-CLASS-252-361; US-PATENT-CLASS-210-748) Avail: US Patent and Trademark Office CSCL 20A

A method is described for removing bubbles from a liquid bath such as a bath of molten glass to be used for optical elements. Larger bubbles are first removed by applying acoustic energy resonant to a bath dimension to drive the larger bubbles toward a pressure well where the bubbles can coalesce and then be more easily removed. Thereafter, submillimeter bubbles are removed by applying acoustic energy of frequencies resonant to the small bubbles to oscillate them and thereby stir liquid immediately about the bubbles to facilitate their breakup and absorption into the liquid. Official Gazette of the U.S. Patent and Trademark Office




**N83-36846*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**ACOUSTIC SUSPENSION SYSTEM Patent**

M. C. LEE (JPL, California Inst. of Tech., Pasadena) and T. G. WANG, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 6 Sep. 1983 7 p Filed 12 Jun. 1981 Supersedes N81-27887 (19 - 18, p 2545) Sponsored by NASA (NASA-CASE-NPO-15435-1; US-PATENT-4,402,221; US-PATENT-APPL-SN-272837; US-PATENT-CLASS-73-505; US-PATENT-CLASS-308-10) Avail: US Patent and Trademark Office CSCL 20A

An acoustic levitation system is described, with single acoustic source and a small reflector to stably levitate a small object while the object is processed as by coating or heating it. The system includes a concave acoustic source which has locations on opposite sides of its axis that vibrate towards and away from a focal point to generate a converging acoustic field. A small reflector is located near the focal point, and preferably slightly beyond it, to create an intense acoustic field that stably spports a small object near the reflector. The reflector is located about one-half wavelength from the focal point and is concavely curved to a

radius of curvature (L) of about one-half the wavelength, to stably spport an object one-quarter wavelength (N) from the reflector.
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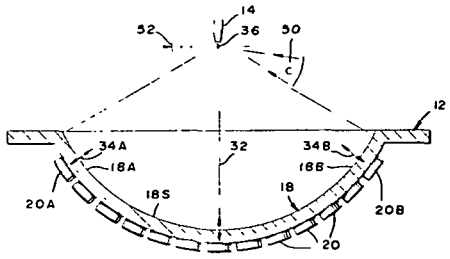
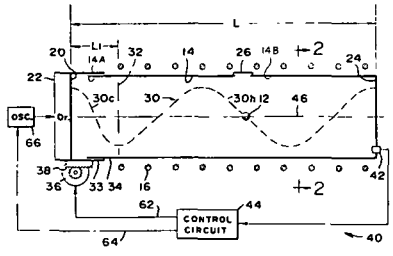



**N83-36847*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**HIGH TEMPERATURE ACOUSTIC LEVITATOR Patent Application**
M. B. BARMATZ, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Aug. 1983 19 p
(Contract NAS7-100)
(NASA-CASE-NPO-16022-1; US-PATENT-APPL-SN-526750)
Avail: NTIS HC A02/MF A01 CSCL 20A

Acoustical levitation of an object within a portion of a chamber is heated to a high temperature, while a driver at the opposite end of the chamber is maintained at a relatively low temperature. The cold end of the chamber is constructed so it is telescoped to vary its length and the entire chamber. The chamber remains resonant to a normal mode frequency, and the pressure at the hot end of the chamber is maximized. The precise length of the chamber at any given time, is maintained at an optimum resonant length by a feedback loop. The feedback loop includes an acoustic pressure sensor at the hot end of the chamber. The output is delivered to a control circuit of the motor that varies the length of the chamber to a level where the sensed acoustic pressure is a maximum.
Author

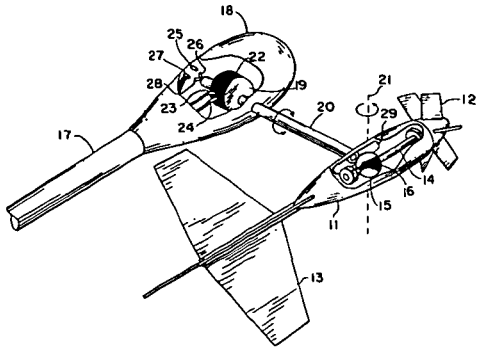



# 74 OPTICS

Includes light phenomena.

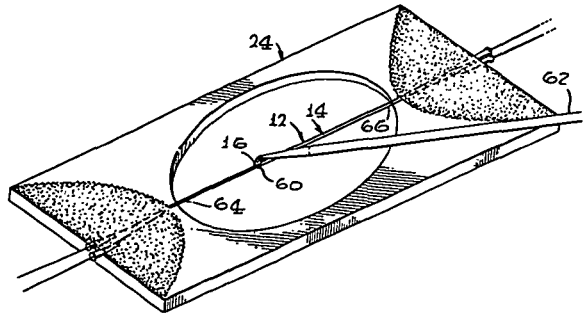
**N83-25539*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**MINIATURE ELECTRO-OPTICAL AIR FLOW SENSOR Patent Application**
D. D. KERSHNER, inventor (to NASA) 14 Apr. 1983 15 p
(NASA-CASE-LAR-13065-1; US-PATENT-APPL-SN-484745)
Avail: NTIS HC A02/MF A01 CSCL 20F

A sensor for measuring flow direction and airspeed is disclosed that is suitable, because of its small size, for rapid instrumentation of research airplanes. A propeller driven sphere rotating at a speed proportional to airspeed presents a reflective target to an electro-optical system. The duty cycle of the resulting electrical output is proportional to yaw angle and the frequency is proportional to airspeed.
NASA




**N83-25540*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**METHOD FOR MAKING A BONDED SINGLE MODE FIBER OPTIC WAVELENGTH COUPLER Patent Application**
W. C. GOSS (JPL, California Inst. of Tech., Pasadena), M. D. NELSON (JPL, California Inst. of Tech., Pasadena), and J. M. MCLAUCHLAN, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Jan. 1983 16 p
(NASA-CASE-NPO-15464-1; US-PATENT-APPL-SN-342828)
Avail: NTIS HC A02/MF A01 CSCL 20F

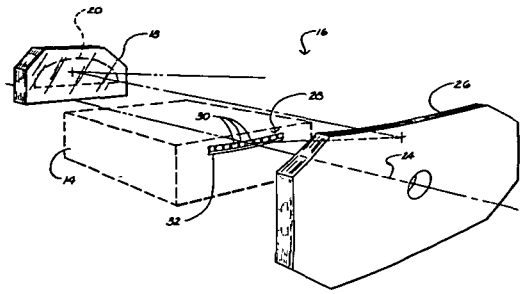
Simple techniques are described for coupling optic fibers for coherently transmitting light from one to the other. Two optical fibers are mounted on a block (such as a microscope slide with a hole) to extend across the hole. The arrangement is immersed in an etchant bath to reduce the thickness of the cladding of the fibers. The fibers are then coupled by running a drop of liquid plastic along the fibers. This zips the fibers together by the surface tension of the liquid plastic, and leaves a thin plastic film on the fibers. When the film hardens, the two fibers are held together. The same zipper action occurs when the block and fiber arrangement is pulled from a liquid bath in an angular direction. In a second technique, weights are hung on one fiber to deflect it against the other, and the fiber claddings are arc welded together.
NASA




**N83-25541*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**OPTICAL SYSTEM Patent Application**
J. B. BRECKINRIDGE (JPL, California Inst. of Tech., Pasadena),

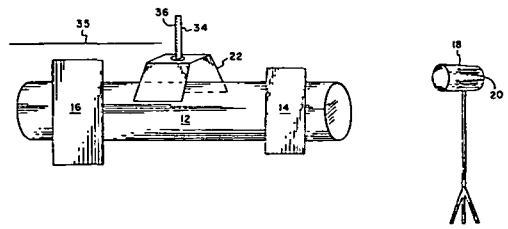
N. A. PAGE (JPL, California Inst. of Tech., Pasadena), R. V. SHACK (JPL, California Inst. of Tech., Pasadena), and R. R. SHANNON, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 23 Mar. 1983 24 p
(Contract NAS7-100)
(NASA-CASE-NPO-15801-1; US-PATENT-APPL-SN-478130)
Avail: NTIS HC A02/MF A01 CSCL 20F

An optical system used in a spacecraft to observe a remote surface and provide a spatial and spectral image of this surface is disclosed. The system includes aspheric and spherical mirrors aligned to focus at a first optical plane an image of the surface, and a mirror at this first focal plane which reflects light back on to the spherical mirror. This spherical mirror collimates the light and directs it through a prism which disperses it. The dispersed light is then focused on an array of light responsive elements disposed at a second focal plane. The prism is designed such that it disperses light into components of different wavelengths, with the components of longer wavelengths to present at the second focal plane a distribution pattern in which preselected groupings of the components are dispersed over essentially equal spacing intervals. NASA



**N83-25542*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ROTARY TARGET V-BLOCK Patent Application**
C. W. MANN, inventor (to NASA) 26 Feb. 1982 12 p
(NASA-CASE-LAR-12007-3; US-PATENT-APPL-SN-352831)
Avail: NTIS HC A01/MF A01 CSCL 20F

A device used in the optical alignment of machinery to maintain a measuring scale in the proper position for optical readings to be taken is described. The device consists of a block containing a notch in the shape of an inverted 'v' and a rotatable plug positioned over the centerline of notch. The block is placed on the object to be aligned, the notch allows the block to be securely placed upon flat or curved surfaces. A weighted measuring scale is inserted through plug so that it contacts the object to be aligned. The scale and plug combination can be rotated so that the scale faces an optical aligning instrument. The instrument is then used in conjunction with the scale to measure the distance of the machinery from a reference plane. NASA



**N83-29032*** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**FIBER OPTIC CROSSBAR SWITCH FOR AUTOMATICALLY PATCHING OPTICAL SIGNALS Patent**
C. H. BELL, inventor (to NASA) 3 May 1983 7 p Filed 27 May 1980 Supersedes N81-12862 (19 - 03, p 0410)
(NASA-CASE-KSC-11104-1; US-PATENT-4,381,881; US-PATENT-APPL-SN-153245; US-PATENT-CLASS-350-96.16; US-PATENT-CLASS-455-612) Avail: US Patent and Trademark Office CSCL 20F

A system for automatically optically switching fiber optic data signals between a plurality of input optical fibers and selective ones of a plurality of output fibers is described. The system includes optical detectors which are connected to each of the input fibers for converting the optic data signals appearing at the respective input fibers to an RF signal. A plurality of RF to optical signal converters are arranged in rows and columns. The output of each of the optical detectors are each applied to a respective row of optical signal converted for being converters back to an optical signal when the particular optical signal converter is selectively activated by a dc voltage.
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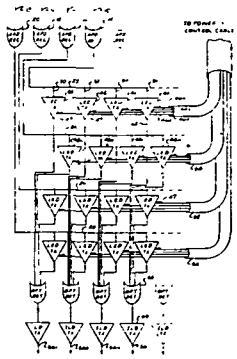
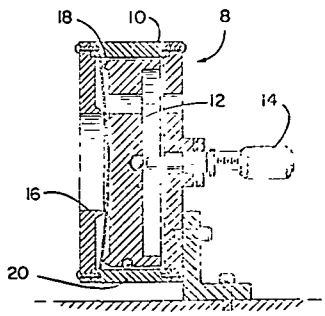


**N83-30222*#** National Aeronautics and Space Administration. Pasadena Office, Calif.
**X-RAY IMAGING MIRROR SYSTEM AND METHOD OF PRODUCING THE SAME Patent Application**
J. H. UNDERWOOD (JPL, California Inst. of Tech., Pasadena) and T. H. BARBEE, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 26 Aug. 1982 17 p Sponsored by NASA
(NASA-CASE-NPO-15828-1; US-PATENT-APPL-SN-411767)
Avail: NTIS HC A02/MF A01 CSCL 20F

An X-ray mirror assembly capable of reflecting X-rays at a normal incident angle is described as well as a method for its production. The mirror assembly includes multi-layers of a high- and low-refractive index material on an extremely smooth substrate such as a silicon wafer. Approximately 152 layers of alternatively a spacer material and a heavy metal, in a thickness range of 1 nanometer, is placed on a silicon wafer. The wafer substrate can be subsequently bent around its periphery by a bending assembly to create a concave configuration. The resulting mirror assembly is capable of focusing normal-incident X-ray radiation, for example, of 4.5 nanometers with a reflection of 6% or greater. NASA



**N83-32577*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**INTERFEROMETRIC ANGLE MONITOR Patent**
P. O. MINOTT, inventor (to NASA) 26 Jul. 1983 6 p Filed 8 Oct. 1980 Supersedes N81-12386 (19 - 03, p 0346)
(NASA-CASE-GSC-12614-1; US-PATENT-4,395,123; US-PATENT-APPL-SN-195227; US-PATENT-CLASS-356-353; US-PATENT-CLASS-356-363) Avail: US Patent and Trademark Office CSCL 20F

Two mutually coherent light beams formed from a single monochromatic light source were directed to a reflecting surface of a rotatable object. They were reflected into an imaging optical lens having a focal plane optically at infinity. A series of interference fringes were formed in the focal plane which were translated linearly in response to angular rotation of the object. Photodetectors were located adjacent the focal plane to detect the fringe translation and output a signal in response to the translation. The signal was fed to a signal processor which was adapted to count the number of fringes detected and develop a measure of the angular rotation and direction of the object.

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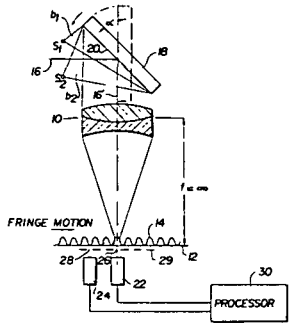
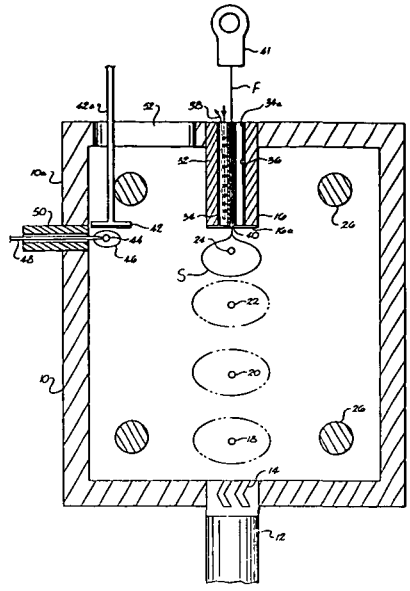



**N83-35825*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**CONTAINERLESS HIGH PURITY PULLING PROCESS AND APPARATUS FOR GLASS FIBERS Patent Application**
R. J. NAUMANN and E. C. ETHRIDGE, inventors (to NASA) 26 Aug. 1983 15 p
(NASA-CASE-MFS-25905-1; US-PATENT-APPL-SN-526754)
Avail: NTIS HC A02/MF A01 CSCL 20F

An apparatus and method for pulling optical glass fibers in a containerless environment is the levitation furnace in which a specimen is levitated and melted. A reflector unit, carried in the interior of the furnace, includes a reflector disposed centrally about the acoustical axis of the levitator. The reflector unit has a circular shroud of insulation and a hollow copper sleeve for receiving a cooling medium. A fiber pulling bore is formed centrally in the reflector unit surrounded by the cooling jacket to enhance solidification and fiber formation. A starting fiber strand is introduced into the melt and pulled outwardly through the bore whereby the specimen fiber is started and formed as it is pulled through. As a continuous process, a movable secondary reflector captures a supplemental specimen pellet then transfers it to the melt. This may be repeated as a continuous process as pellets are inserted through a port. NASA



**N83-36898*** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**HIGH SPEED MULTI FOCAL PLANE OPTICAL SYSTEM Patent**
P. O. MINOTT, inventor (to NASA) 4 Oct. 1983 6 p Filed 22 Dec. 1981 Supersedes N82-24973 (20 - 15, p 2159)
(NASA-CASE-GSC-12683-1; US-PATENT-4,407,563; US-PATENT-APPL-SN-333535; US-PATENT-CLASS-350-173; US-PATENT-CLASS-350-445) Avail: US Patent and Trademark Office CSCL 20F

An apparatus for eliminating beamsplitter generated optical aberrations in a pupil concentric optical system providing a plurality of spatially separated images on different focal planes or surfaces is presented. The system employs a buried surface beamsplitter having spherically curved entrance and exit faces which are concentric to a system aperture stop with the entrance face being located in the path of a converging light beam directed there from an image forming objective element which is also concentric to the aperture stop.

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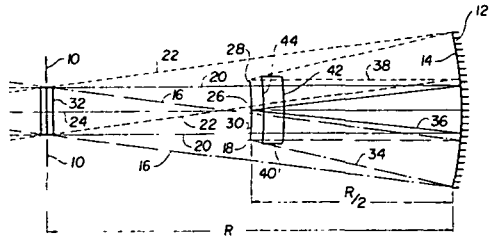

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Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

**N83-30268*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

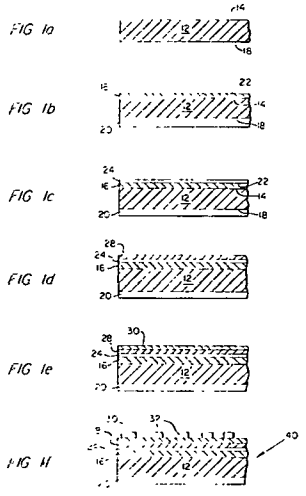
**GAAS SCHOTTKY BARRIER PHOTO-RESPONSIVE DEVICE AND METHOD OF FABRICATION Patent Application**

C. Z. LEINKRAM (Howard Univ., Washington, D.C.), O. OKUNOLA (Howard Univ., Washington, D.C.), and G. E. ALCORN, inventors (to NASA) 24 Jun. 1983 11 p

(NASA-CASE-GSC-12816-1; US-PATENT-APPL-SN-507625)

Avail: NTIS HC A02/MF A01 CSCL 20L

A gallium arsenide photo-responsive device is provided with an intermediate, transparent layer of a refractory metal or alkaline earth metal forming a tenacious bond between a non-hydroscopic oxide layer and a noble metal Schottky barrier layer. The device has a gallium arsenide substrate with a predetermined type conductivity and a gallium arsenide epitaxial layer with the same type conductivity but a lower charge carrier concentration grown on the substrate. The oxide layer is formed to cover the epitaxial layer, and the transparent metal layer followed by the noble metal layer are deposited upon the oxide layer. An interdigitated ohmic contact is then formed upon the noble metal layer. NASA




**N83-30269*#** National Aeronautics and Space Administration. Pasadena Office, Calif.

**METHOD FOR GROWING LOW DEFECT, HIGH PURITY CRYSTALLINE LAYERS Patent Application**

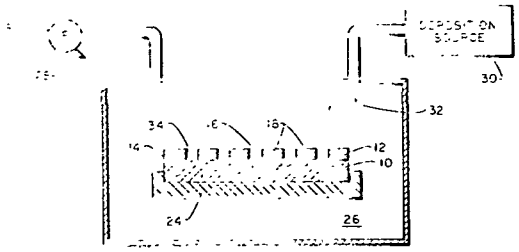
A. D. MORRISON (JPL, California Inst. of Tech., Pasadena) and T. DAUD, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 24 Jun. 1983 13 p

(Contract NAS7-100)

(NASA-CASE-NPO-15813-1; US-PATENT-APPL-SN-502624)

Avail: NTIS HC A02/MF A01 CSCL 20L

The purity and perfection of a semiconductor is improved by depositing a patterned mask of a material impervious to impurities of the semiconductor on a surface of a blank. When a layer of semiconductor is grown on the mask, the semiconductor will first grow from the surface portions exposed by the openings in the mask and will bridge the connecting portions of the mask to form a continuous layer having improved purity, since only the portions overlying the openings are exposed to defects and impurities. The process can be reiterated and the mask translated to further improve the quality of grown layers. NASA




**N83-34796*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**PIEZOELECTRIC COMPOSITE MATERIALS Patent**

L. J. KIRALY, inventor (to NASA) 23 Aug. 1983 4 p Filed 12 Jul. 1982 Supersedes N82-31450 (20 - 22, p 3102)

(NASA-CASE-LEW-12582-1; US-PATENT-4,400,642; US-PATENT-APPL-SN-397281; US-PATENT-CLASS-310-332; US-PATENT-CLASS-310-800; US-PATENT-CLASS-428-294; US-PATENT-CLASS-428-421; US-PATENT-CLASS-428-422)

Avail: US Patent and Trademark Office CSCL 20L

A laminated structural devices has the ability to change shape, position and resonant frequency without using discrete motive components. The laminate may be a combination of layers of a piezoelectrically active, nonconductive matrix material. A power source selectively places various levels of charge in electrically conductive filaments imbedded in the respective layers to produce various configurations in a predetermined manner. The layers may be electrically conductive having imbedded piezoelectrically active filaments. A combination of layers of electrically conductive material may be laminated to layers of piezoelectrically active material.

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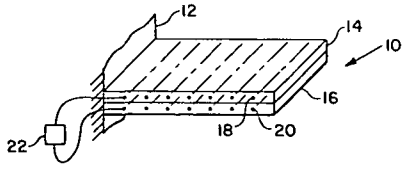


**N83-35888*** National Aeronautics and Space Administration. Pasadena Office, Calif.

**METHOD OF INCREASING MINORITY CARRIER LIFETIME IN SILICON WEB OR THE LIKE Patent**

J. K. LIU (JPL, California Inst. of Tech., Pasadena), G. H. SCHWUTTKE (JPL, California Inst. of Tech., Pasadena), and K. M. KOLIWAD, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) 30 Aug. 1983 4 p Filed 31 Mar. 1982 Supersedes N82-24933 (20 - 15, p 2162) Sponsored by NASA

(NASA-CASE-NPO-15530-1; US-PATENT-4,401,505; US-PATENT-APPL-SN-364092; US-PATENT-CLASS-156-608; US-PATENT-CLASS-156-DIG.6; US-PATENT-CLASS-156-DIG.73)

Avail: US Patent and Trademark Office CSCL 20L

A silicon dendrite is grown as a ribbon forming two silicon crystal layers which are separated by an interface layer which contains a large number of defects. Significant increase of minority carrier lifetime with homogeneous distribution at the outer surfaces of the two silicon crystal layers is achieved by processing the web in an atmosphere of a selected gas, e.g., oxygen, nitrogen or an inert gas, for about 30 minutes to several hours at a temperature preferably on the order of 900 to 1200 C.

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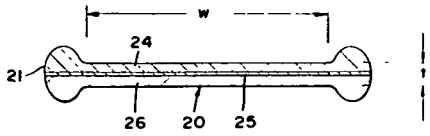

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Section 1: Abstracts

16. Abstract

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