NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JULY 1985

(NASA-SP-7039 (27)-Section-1) NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY, SECTION 1: ABSTRACTS (SUPPLEMENT 27) (National Aeronautics and Space Administration) 47 p HC $10.00

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
### ACCESSION NUMBER RANGES

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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 January 1985 and June 1985
This supplement is available as NASA SP-7039(27) SEC 1 from the National Technical Information Service (NTIS), Springfield, Virginia 22161. For information regarding the purchase price (which is subject to change), please write or call NTIS at (703) 487-4650
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 92 citations published in this issue of the Abstract Section cover the period January 1985 through June 1985. The Index Section references over 4300 citations covering the period May 1969 through June 1985.

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.
An aircraft system for increasing the lift drag ratio over a broad range of operating conditions is described. The system positions the engines and nacelles over the wing in such a position that gains in propeller efficiency is achieved simultaneously with increases in wing lift and a reduction in wing drag. Adverse structural and torsional effects on the wings are avoided by fuselage mounted pylons which attach to the upper portion of the fuselage aft of the wings. Similarly, pylon wing interference is eliminated by moving the pylons to the fuselage. Further gains are achieved by locating the pylon surface area aft of the aircraft center of gravity, thereby augmenting both directional and longitudinal stability. This augmentation has the further effect of reducing the size, weight and drag of empennage components. The combination of design changes results in improved cruise performance and increased climb performance while reducing fuel consumption and drag and weight penalties.
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, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent 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.
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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, 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.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

14 CFR Part 1245

Licensing of NASA Inventions

AGENCY: National Aeronautics and Space Administration.

ACTION: Interim regulation with 14 CFR Part 1245 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 C. Mannix, Director of Patent Licensing, CP-4, NASA, Washington, D.C. 20546

FOR FURTHER INFORMATION CONTACT: Mr. John C. 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

§ 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 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) "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.

(b) "NASA Invention" means an invention, or both, and with information about the applicant's capability to fulfill the plan.

(c) "Nonexclusive license" means a license 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.

(d) "United States" means the United States Government, and a copy of such Government procurement, contained in 13 CFR 121.3-8 and in subcontracting, composition or product, to practice 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.

Subpart 2—Licensing of NASA Inventions

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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 expedient granting of such a license will best serve the interests of the Federal Government and the public; and (iv) in either situation, specified in § 1245.204(a)(1)(ii) or (vi) 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) (i)(iii)(A) and consideration of any written objections received during the period. NASA has determined that...

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

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

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

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

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

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

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

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

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

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

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

(b) Foreign licenses.

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

(i) Notice of a prospective license, identifying the invention and prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections...
within a 60-day period and following consideration of such objections; (ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced, and (iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

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

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

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

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

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

Procedures

§ 1245.207 Application for a license.

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

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

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

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

(d) Name, address, and telephone number of representative of applicant to whom correspondence will 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;

(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)(i)(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)(i)(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 §§ 1245.208(a)(1)(ii)(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.

§1245.213 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. Boggs,
Administrator.
October 15, 1981.

[FR Doc. 81-31008 Filed 10-30-81 8:45 am]
BILLING CODE 7510-01-M
# 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 *Aeronautics*

<table>
<thead>
<tr>
<th>01</th>
<th>AERONAUTICS (GENERAL)</th>
<th>N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>AERODYNAMICS</td>
<td>N.A.</td>
</tr>
<tr>
<td>03</td>
<td>AIR TRANSPORTATION AND SAFETY</td>
<td>N.A.</td>
</tr>
<tr>
<td>04</td>
<td>AIRCRAFT COMMUNICATIONS AND NAVIGATION</td>
<td>N.A.</td>
</tr>
<tr>
<td>05</td>
<td>AIRCRAFT DESIGN, TESTING AND PERFORMANCE</td>
<td>1</td>
</tr>
<tr>
<td>06</td>
<td>AIRCRAFT INSTRUMENTATION</td>
<td>N.A.</td>
</tr>
<tr>
<td>07</td>
<td>AIRCRAFT PROPULSION AND POWER</td>
<td>N.A.</td>
</tr>
<tr>
<td>08</td>
<td>AIRCRAFT STABILITY AND CONTROL</td>
<td>2</td>
</tr>
<tr>
<td>09</td>
<td>RESEARCH AND SUPPORT FACILITIES (AIR)</td>
<td>2</td>
</tr>
</tbody>
</table>

### ASTRONAUTICS

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

For related information see also *Aeronautics*

| 12 | ASTRONAUTICS (GENERAL) | N.A. |
| 13 | ASTRODYNAMICS | N.A. |
| 14 | GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) | N.A. |
| 15 | LAUNCH VEHICLES AND SPACE VEHICLES | 3 |
| 16 | SPACE TRANSPORTATION | N.A. |
| 17 | SPACECRAFT COMMUNICATION, COMMAND AND TRACKING | N.A. |
| 18 | SPACECRAFT DESIGN, TESTING AND PERFORMANCE | N.A. |
| 19 | SPACECRAFT INSTRUMENTATION | N.A. |
| 20 | SPACECRAFT PROPULSION AND POWER | 3 |

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*

For related information see also *Aeronautics* and *Space Transportation*

For related information see also *32 Communications* and *35 Instrumentation and Photography*
### CHEMISTRY AND MATERIALS

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

**23 CHEMISTRY AND MATERIALS (GENERAL)**
N.A.
Includes biochemistry and organic chemistry

**24 COMPOSITE MATERIALS**
4
Includes laminates

**25 INORGANIC AND PHYSICAL CHEMISTRY**
4
Includes chemical analysis, e.g., chromatography, combustion theory, electrochemistry, and photochemistry
For related information see also 77 Thermodynamics and Statistical Physics

**26 METALLIC MATERIALS**
5
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion, and metallurgy

**27 NONMETALLIC MATERIALS**
6
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials

**28 PROPELLANTS AND FUELS**
N.A.
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

### 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

**31 ENGINEERING (GENERAL)**
10
Includes vacuum technology, control engineering, display engineering, and cryogenics

**32 COMMUNICATIONS**
12
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

**33 ELECTRONICS AND ELECTRICAL ENGINEERING**
13
Includes test equipment and maintainability, components, e.g., tunnel diodes and transistors, miniaturization, and integrated circuitry
For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics

**34 FLUID MECHANICS AND HEAT TRANSFER**
15
Includes boundary layers, hydrodynamics, fluids, mass transfer, and ablation cooling
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics

### 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

**36 LASERS AND MASERS**
19
Includes parametric amplifiers

**37 MECHANICAL ENGINEERING**
20
Includes auxiliary systems (non-power), machine elements and processes, and mechanical equipment

**38 QUALITY ASSURANCE AND RELIABILITY**
N.A.
Includes product sampling procedures and techniques, and quality control

**39 STRUCTURAL MECHANICS**
N.A.
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

### 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

**42 GEOSCIENCES (GENERAL)**
N.A.

**43 EARTH RESOURCES**
22
Includes remote sensing of earth resources by aircraft and spacecraft, photogrammetry, and aerial photography
For instrumentation see 35 Instrumentation and Photography

**44 ENERGY PRODUCTION AND CONVERSION**
23
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

**45 ENVIRONMENT POLLUTION**
N.A.
Includes air, noise, thermal and water pollution, environment monitoring, and contamination control

**46 GEOPHYSICS**
24
Includes aeronomic, upper and lower atmosphere studies, ionospheric and magnetospheric physics, and geomagnetism
For space radiation see 93 Space Radiation

**47 METEOROLOGY AND CLIMATOLOGY**
N.A.
Includes weather forecasting and modification

**48 OCEANOGRAPHY**
N.A.
Includes biological, dynamic and physical oceanography, and marine resources
LIFE SCIENCES
Includes sciences (general), aerospace medicine, behavioral sciences, man/system technology and life support, and planetary biology

51 LIFE SCIENCES (GENERAL) N.A.
Includes genetics.

52 AEROSPACE MEDICINE 24
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 25
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 26
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 26
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 27
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 28
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

SUBJECT INDEX
INVENTOR INDEX
SOURCE INDEX
NUMBER INDEX
ACCESSION NUMBER INDEX
Includes aircraft simulation technology

**N85-19980**# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

**OVER THE WING PROPELLER Patent Application**

J L JOHNSON, JR and E R WHITE, inventors (to NASA)

(Kentron International, Inc., Hampton, Va) 16 Oct 1984 12 p

(NASA-CASE-LAR-13134-1, NAS 1 71 LAR-13134-1, US-PATENT-APPL-SN-661478) Avail NTIS HC A02/MF A01 CSCL 01C

An aircraft system for increasing the lift drag ratio over a broad range of operating conditions is described. The system positions the engines and nacelles over the wing in such a position that gains in propeller efficiency is achieved simultaneously with increases in wing lift and a reduction in wing drag. Adverse structural and torsional effects on the wings are avoided by fuselage mounted pylons which attach to the upper portion of the fuselage aft of the wings. Similarly, pylon wing interference is eliminated by moving the pylons to the fuselage. Further gains are achieved by locating the pylon surface area aft of the aircraft center of gravity, thereby augmenting both directional and longitudinal stability. This augmentation has the further effect of reducing the size, weight and drag of empennage components. The combination of design changes results in improved cruise performance and increased climb performance while reducing fuel consumption and drag and weight penalties.

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**N85-21147**# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

**EXTENDED MOMENT ARM ANTI-SPIN DEVICE Patent**

R D WHIPPLE, inventor (to NASA) 29 Jan 1985 8 p Filed 27 Jun 1983 Supersedes N83-29173 (21 - 18, p 2867)


A device which corrects aerodynamic spin is provided in which a collapsible boom extends an aircraft moment arm and an anti-spin parachute force is exerted upon the end of the moment arm to correct intentional or inadvertent aerodynamic spin. 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.

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**N85-19981**# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

**REMOTE PIVOT DECOUPLER PYLON: WING/STORE SUPPRESSION Patent Application**

J M HASSLER, JR., inventor (to NASA) 10 Jan 1985 16 p

(NASA-CASE-LAR-13173-1, NAS 1 71 LAR-13173-1, US-PATENT-APPL-SN-690274) Avail NTIS HC A02/MF A01 CSCL 01C

A device for suspending a store from an aerodynamic support surface, such as an aircraft wing, and more specifically, for improving upon singlet pivot decoupler pylons by reducing both frequency of active store, alignment and alignment system space and power requirements. Two links suspend a lower pylon section, and releasable attached store from an upper pylon section mounted under wing. The links allow the lower pylon section to rotate in pitch about a remote pivot point. A leaf spring connected between the lower section and electrical alignment system servomechanism provides pitch alignment of the lower section/store combination. The servomechanism utilizes an electric servomotor to drive gear train and reversibly move the leaf spring, thereby maintaining the pitch attitude of store within acceptable limits. Damper strokes when lower section rotates to damp large oscillations of store.

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Official Gazette of the U S Patent and Trademark Office
AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities, piloting, flight controls, and autopilots

N85-19985* National Aeronautics and Space Administration Langley Research Center, Hampton, Va

LEADING EDGE FLAP SYSTEM FOR AIRCRAFT CONTROL AUGMENTATION Patent

Traditional roll control systems such as ailerons, elevons or spoilers are least effective at high angles of attack due to boundary layer separation over the wing. This invention uses independently deployed leading edge flaps on the upper surfaces of vortex stabilized wings to shift the center of lift outboard. A rolling moment is created that is used to control roll at high angles of attack. The effectiveness of the rolling moment increases linearly with angle of attack. No adverse yaw effects are induced. In an alternate mode of operation, both leading edge flaps are deployed together at cruise speeds to create a very effective airbrake without appreciable modification in pitching moment. Little trim change is required.

Official Gazette of the U S Patent and Trademark Office

LIFT

RESEARCH AND SUPPORT FACILITIES (AIR)

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

N85-19990* National Aeronautics and Space Administration John F Kennedy Space Center, Cocoa Beach, Fla

INFLIGHT IFR PROCEDURES SIMULATOR Patent

An inflight IFR procedures simulator for generating signals and commands to conventional instruments provided in an airplane is described. The simulator includes a signal synthesizer which generates predetermined simulated signals corresponding to signals normally received from remote sources upon being activated. A computer is connected to the signal synthesizer and causes the signal synthesizer to produce simulated signals responsive to programs fed into the computer. A switching network is connected to the signal synthesizer, the antenna of the aircraft, and navigational instruments and communication devices for selectively connecting instruments and devices to the synthesizer and disconnecting the antenna from the navigational instruments and communication device. Pressure transducers are connected to the altimeter and speed indicator for supplying electrical signals to the computer indicating the altitude and speed of the aircraft. A compass is connected for supply electrical signals for the computer indicating the heading of the airplane. The computer upon receiving signals from the pressure transducer and compass, computes the signals that are fed to the signal synthesizer which, in turn, generates simulated navigational signals.

Official Gazette of the U S Patent and Trademark Office

CONTINUOUS LAMINAR SMOKE GENERATOR Patent

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

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

LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters, manned orbital laboratories, reusable vehicles,
and space stations

N85-11122* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
MAGNETIC SPIN REDUCTION SYSTEM FOR FREE SPINNING
OBJECTS Patent Application
G F VONTEESNHAUSEN, inventor (to NASA) 23 Aug 1984
13 p
(NASA-CASE-MFS-25966-1, NAS 171 MFS-25966-1,
US-PATENT-APPL-SN-643522) Aval NTIS HC A02/MF A01
CSCL 22B

A magnetic system and method is described for reducing the
spin rate of a freely rotating or tumbling satellite. Spin reduction
is accomplished by the recovery spacecraft having a mast carrying
an electrical current carrying coil which encircles the satellite. The
magnetic field of the coil is normal to the spin axis of the satellite
which causes circular eddy current flow in the housing of the
satellite which generates magnetic force opposing the rotation.
In another embodiment the magnetic field is generated by the use
of an electromagnet on a remote manipulation arm.

N85-21256* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio
RING-CUSP ION THRUSTER WITH SHELL ANODE Patent
J S SOVEY, V K RAHLIN, and R F ROMAN, inventors (to
N83-21903 (21-11, p 1783)
(NASA-CASE-LEW-13881-1, NAS 171 LEW-13881-1;
Office CSCL 21C

An improved ion thruster for low specific impulse operation in
the 1500 sec to 6000 sec range has a multicusp boundary field
provided by high strength magnets on an iron anode shell which
lengthens the paths of electrons from a hollow cathode assembly. A downstream anode pole piece in the form of an iron ring supports a ring of magnets to provide a more uniform beam profile. A cylindrical cathode magnet can be moved selectively in an axial direction along a feed tube to produce the desired magnetic field at the cathode tip. 

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

24 COMPOSITE MATERIALS

Includes laminates


A high temperature oxidation resistant, thermal barrier coating system is disclosed for a nickel cobalt, or iron base alloy substrate. An inner metal bond coating contacts the substrate, and a thermal barrier coating covers the bond coating. NiCrAlR, FeCrAlR, and CoCrAlR alloys are satisfactory as bond coating compositions where R = Y or Yb. These alloys contain, by weight, 24-36% chromium, 5-18% 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. Partially stabilized zirconia consists of mixtures of cubic, tetragonal, and monoclinic phases.

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


A carbon coating was vacuum arc deposited on a smooth surface of a target which was simultaneously ion beam sputtered. The bombarding ions have sufficient energy to create diamond bonds. Spalling occurs as the carbon deposit thickens. The resulting diamond like carbon flakes improve thermal, electrical, mechanical, and tribological properties when used in aerospace structures and components.

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

25 INORGANIC AND PHYSICAL CHEMISTRY

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


Contaminants in an extended medium such as the wall of a building are mapped by locating neutron excitation source on one side of the wall and a gamma ray spectrometer, including a gamma ray detector on the opposite side of the wall facing the excitation source. The source and detector are moved in unison in discrete steps over opposing wall surfaces so as to determine the chemical composition of the elements in a hemispheric region of the wall adjacent the detector with the radius of the region being substantially that of the mean free path distance of gamma rays emitted from elements interacting with neutrons on the detector side of the wall. The source and detector are reversed for relatively thick walls for mapping the distribution of elements on the other side of the wall thickness. The output of the detector is fed to a
multichannel pulse height analyzer where the intensity of the various gamma ray spectral lines are indicated relative to a dominant constituent element such as silicon. Resolution of anomalies such as the presence of voids and/or determining the bulk density of the medium is achieved by substituting a gamma ray source technique is also applied to metal alloys, such as iron alloys, in either the solid or molten state.

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

A surface of a steel substrate is nitrided by exposing it to a beam of nitrogen ions under a low pressure. The pressure is much lower than that employed for ion-nitriding, and an ion source is used instead of a glow discharge. Both of these features reduce the introduction of impurities into the substrate surface.

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

A method of producing tris (N-methylamino) methylsilane is described including the steps of forming and cooling a liquid solution of methylamino 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-methylamino) methylsilane.

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

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

N85-20123* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

THERMOSET-THERMOPLASTIC AROMATIC POLYAMIDE CONTAINING N-PROPARGYL GROUPS Patent

A composition and method are disclosed for increasing the use temperature of polyamides based on the incorporation of a latent crosslinking agent into the polymer backbone, wherein high temperature performance is achieved without sacrificing solubility or processability

Official Gazette of the U S Patent and Trademark Office

N85-20124* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

PROCESS FOR PREPARING SOLVENT RESISTANT, THERMOPLASTIC AROMATIC POLY(IMIDESULFONE) Patent

A process for preparing a thermoplastic poly(imidesulfone) is disclosed This resulting material has thermoplastic properties which are generally associated with polysulfones but not polymides and solvent resistant 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 polyamide by dissolving a quantity of a 3,3',4,4'-benzophenonetetraacryboxylic dianhydride (BTD) 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

Official Gazette of the U S Patent and Trademark Office

N85-20125* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

HOT MELT ADHESIVE ATTACHMENT PAD Patent

A hot melt adhesive attachment pad for releasably securing distinct elements together is described which is 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 thermo-flood heater, and a thermo-cooler These components are securely 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

Official Gazette of the U S Patent and Trademark Office

N85-20126* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala

INSULATION BONDING TEST SYSTEM Patent

A method and a system for testing the bonding of foam insulation attached to metal is described The system involves the use of an impacter which has a calibrated load cell mounted on a plunger and a hammer head mounted on the end of the plunger When the impacter strikes the insulation at a point to be tested, the load cell measures the force of the impact and the precise time interval during which the hammer head is in contact with the insulation This information is transmitted as an electrical signal to a load cell amplifier where the signal is conditioned and then transmitted to a fast Fourier transform (FFT) analyzer The FFT analyzer produces energy spectral density curves which are displayed on a video screen The termination frequency of the energy spectral density curve may be compared with a
A predetermined empirical scale to determine whether a high quality bond, good bond, or debond is present at the point of impact.

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

between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface.

NASA

N85-20128* National Aeronautics and Space Administration Langley Research Center, Hampton, Va

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

Patent Application

A K STCLAIR and T L STCLAIR, inventors (to NASA) 23 Aug 1984 11 p

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

NASA

N85-21347* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

PHOSPHORUS-CONTAINING IMIDE RESINS

Patent

I K VARMA (NAS-NRC, Washington, D.C.), G M FOHLEN, and J A PARKER, inventors (to NASA) 29 Jan 1985 7 p

Cured polymers of bis and tri-imides derived from m-aminophenyl phosphine oxides by reaction with maleic anhydride or its derivatives, and addition polymers of such imides, including a variant in which a monoimide is condensed with a dihydride and the product is treated with a further quantity of maleic anhydride prior to curing are disclosed and claimed. Such polymers are flame resistant. Also disclosed are an improved method of producing m-aminophenyl phosphine oxides from their nitro analogues by reduction with hydrazine hydrate using palladized charcoal or Raney nickel as the catalyst and fiber reinforced cured resin composites.

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

N85-20129* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

OXIDATION PROTECTION COATINGS FOR POLYMERS

Patent Application

M J MIRTICH, B A BANKS, and J S SOVEY, inventors (to NASA) 11 Sep 1984 11 p

A polymer substrate is coated with a metal oxide film to provide oxidation protection in low earth orbital environments. The film contains about 4 volume percent polymer to provide flexibility. A coil of polymer material moves through an ion beam as it is fed

NASA

N85-21348* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

PHTHALOCYANINE POLYMERS

Patent

B N ACHAR (NAS-NRC, Washington, D.C.), G M FOHLEN, and J A PARKER, inventors (to NASA) 12 Feb 1985 14 p

Several polymers derived from m-phenylene or m-aminophenylene phophine oxides from their nitro analogues by reduction with hydrazine hydrate using palladized charcoal or Raney nickel as the catalyst and fiber reinforced cured resin composites.
A method of forming 4,4',4",4"'-tetraamino phthalocyanines involves reducing 4,4',4",4"'-tetranitro phthalocyanines, polymerizing the metal tetraamino phthalocyanines with a tetracarboxylic dianhydride (preferably aromatic) or copolymerizing with a tetracarboxylic dianhydride and a diamine (preferably also aromatic) to produce amic acids which are then dehydrocyclized to imides. Thermally and oxidatively stable polymers result which form tough, flexible films, varnishes, adhesives, and fibers.

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 has been mixed, and utilizing solvent or mixture of solvents for the reaction.

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 norborneny1 capped reactant and/or holding initiation and polymerization to a rate compatible with the availability of the maleic-capped reactant.

A chemical approach for controlling nadimide cure temperature and rate with maleimide patent.

Elasticomer toughened polyimide adhesives patent.

Chemical approach for controlling nadimide cure temperature and rate with maleimide patent.

Chemical approach for controlling nadimide cure temperature and rate with maleimide patent.

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 endcapped reactant. This control is achieved by adding sufficient amounts of said maleic reactant or by chemical modification of either copolymer, to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or hold initiation and polymerization to a rate compatible with the availability of the maleic capped reactant.

Official Gazette of the US Patent and Trademark Office


An aromatic condensation polymer film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the process for preparing same are disclosed. A feature to achieve maximum optical transparency films requires the utilization of recrystallized and/or sublimated specific aromatic diamines and dihydride monomers and introduction bulky electron withdrawing groups and separator groups into the polymer molecular structure. The incorporation of bulky electron withdrawing groups in the dianhydride portion of the polymer structure serves to reduce the formation of interchain and intrachain charge transfer complexes which normally cause large absorptions in the UV visible range. Incorporation of separator atoms into either the diimide or triazine monomers serves to reduce the amount of conjugation and inter and intrachain electronic interactions to lessen charge transfer complex formation.


Metal, preferably divalent copper, cobalt or nickel, phthalocyanine tetraamines are used as curing agents for epoxides. The resulting copolymers have high thermal and chemical resistance and are homogeneous. They are useful as binders for laminates, e.g., graphite cloth laminate.


The 1-(diorgano oxyphosphonyl)methyl-2,4 and -2,6-diamino benzenes are reacted with polyaclyhalides and optionally comonomers to produce polyamides which have desirable heat and fire resistance properties. These polymers are used to form fibers and fabrics where fire and flame resistance properties are important, like aircraft equipment and structures.


The 1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diamino benzenes are synthesized in a two step polycondensation reaction from 1-(diorganooxyphosphonyl)methyl-2,4- and -2,6-diaminobenzenes and tetracarbocyclic anhydride. The diorgano position of the diorganooxyphosphonyl group includes alkyl, such as ethyl, substituted alkyl, such as 2-chloroethyl, and aryl such as phenyl. The tetracarbocyclic anhydrides include compounds such as pyromelic dihydride and benzophenone tetracarbocyclic dihydride. The glass transition temperature of the polyimides is reduced by incorporation of the (diorganooxyphosphonylmethyl groups. Both the molecular weight and the thermal stability of the polymers are reduced with increasing concentration of the phosphorus moieties. The phosphorous containing copolyimides show a considerably higher degree of fire resistance as compared to that of the corresponding common polyimides, and can be used in matrix composites in very thermally stable high temperature graphite composites for aircraft applications.


Phosphorus containing polyamides and copolyamides are synthesized in a two step polycondensation reaction from 1-(diorgano oxyphosphonylmethyl-2,4- and -2,6-diaminobenzenes and tetracarboxylic anhydride. The diorgano position of the diorganooxyphosphonyl group includes alkyl, such as ethyl, substituted alkyl, such as s 2-chloroethyl, and aryl such as phenyl. The tetracarboxylic anhydrides include compounds such as pyromelic dihydride and benzophenone tetracarboxylic dihydride. The glass transition temperature of the polyimides is reduced by incorporation of the (diorganooxyphosphonylmethyl groups. Both the molecular weight and the thermal stability of the polymers are reduced with increasing concentration of the phosphorous moieties. The phosphous containing copolyimides show a considerably higher degree of fire resistance as compared to that of the corresponding common polyimides, and can be used in matrix composites in very thermally stable high temperature graphite composites for aircraft applications.


Metal, preferably divalent copper, cobalt or nickel, phthalocyanine tetraammines are used as curing agents for epoxides. The resulting copolymers have high thermal and chemical resistance and are homogeneous. They are useful as binders for laminates, e.g., graphite cloth laminate.
A novel class of fire and heat resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-(dialkox phosphonyl)methyl-2,4 and -2,6-diamino benzene was presented. The polymer precursors are prepared by reacting 1-(diorganophosphonyl)methyl-2,4- and -2,6-diaminobenzenes with maleic anhydride or citraconic anhydride in a mole ratio 1:2. Chain extension of the monomers is achieved by reacting the mono-N-maleimido derivatives of 1-(diorganophosphonyl)methyl-2,4 and -2,6-diaminobenzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylenebis(4-phenylisocyanate), in a mole ratio 2:1. The polymerization of the monomers is studied by differential scanning calorimetry (DSC) and the thermal stability of the polymers is ascertained by thermogravimetric analysis (TGA).

This addition of energy to the system increases mobility of the condensing atoms and serves to remove lesser bound atoms.
TEXTURED CARBON SURFACES ON COPPER Patent
Application
A N CURREN, K A. JENSEN, and R F ROMAN, inventors (to NASA) 10 Oct 1984 12 p
(NASA-CASE-LEW-14130-1, NAS 1 71 LEW-14130-1,
US-PATENT-APPL-SN-659475) Avail NTIS HC A02/MF A01
CSCL 13H

A very thin layer of highly textured carbon is applied to a copper surface by a torch sputtering process. A carbon target and a copper substrate are simultaneously exposed to an argon plasma in a vacuum chamber. The resulting carbon surface is characterized by a dense, random array of needle-like spines or peaks which extend perpendicularly from the copper surface. The coated copper is especially useful for electrode plates in multistage depressed collectors.

MAGNETICALLY ACTUATED COMPRESSOR Patent
Application
J EVANS and P A STUDER, inventors (to NASA) 19 Feb 1985 9 p Filed 28 Jan 1983 Supersedes N83-20153 (21 p, 1526)
(NASA-CASE-GSC-12798-1; NAS 1 71 GSC-12799-1,
US-PATENT-4,500,265, US-PATENT-APPL-SN-461724,

A vibration free fluid compressor particularly adapted for Stirling cycle cryogenic refrigeration apparatus comprises a pair of identical opposing ferromagnetic pistons located in a housing and between a gas spring including a sealed volume of a working fluid such as gas under pressure. The gas compresses and expands in accordance with movement of the pistons to generate a compression wave which can be vented to other apparatus, for example, a displacer unit in a Stirling cycle engine. The pistons are urged outwardly due to the pressure of the gas, however, a fixed electromagnetic coil assembly located in the housing adjacent the pistons, is periodically energized to produce a magnetic field which interlinks the pistons in such a fashion that the pistons are mutually attracted to one another. The mass of the pistons, in conjunction with the compressed gas between them, forms a naturally resonant system which, when the pistons are electromagnetically energized, produces an oscillating compression wave in the entrapped fluid medium.

IMPROVED SILICON GRINDING METHOD AND APPARATUS Patent Application
E R COLLINS, JR, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 29 Nov 1984 9 p Sponsored by NASA
(NASA-CASE-NPO-16336-1-CU, NAS 1 71 NPO-16336-1-CU,
US-PATENT-APPL-SN-676163) Avail NTIS HC A02/MF A01 CSCL 13H

Opposing streams of silicon particles collide to form a collision product, which is repeatedly graded, refined by a series of jet mills and recycled to provide an output containing an improved yield of useful particles.
An emergency locating transmitting (ELT) system is disclosed which comprises a legislated ELT modified with an interface unit and connected by a multwire cable to a remote control monitor (RCM), typically located at the pilot position. The RCM can remotely test the ELT by disabling the legislated swept tone and allowing transmission of a single tone, turn the ELT on for legislated ELT transmission, and reset the ELT to an armed condition. The RCM also provides visual and audio indications of transmitter operating condition as well as ELT battery condition. Removing the RCM or shorting or opening the interface input connections are not to affect traditional ELT operation.

A video level control system is provided which generates a normalized video signal for a camera processing circuit. The video level control system includes a lens mount which provides a controlled light signal to a camera tube. The camera tube converts the light signal provided by the lens mount into electrical signals. A feedback circuit in response to the electrical signals generated by the camera tube, provides feedback signals to the lens mount and the camera tube. This assures that the normalized video signal is maintained in a second illumination range.

A local area network is provided for a plurality of autonomous computers which operate at different rates and under different protocols coupled by network bus adapters to a global bus. A host computer (HC) divides a message file to be transmitted into blocks, each with a header that includes a data type identifier and a trailer. The associated network bus adapter (NBA) then divides the data into packets, each with a header to which a transport header and trailer is added with frame type code which specifies one of three modes of addressing in the transmission of data, namely a physical address mode for computer to computer transmission using two bytes for source and destination addresses, a logical address mode and a data type mode. In the logical address mode, one of the two addressing bytes contains a logical channel number (LCN) established between the transmitting and one or more receiving computers. In the data type mode, one of the addressing bytes contains a code identifying the type of data.
DOUBLE REFERENCE PULSED PHASE LOCKED LOOP

A double reference pulse phase locked loop is described which measures the phase shift between tone burst signals initially derived from the same periodic signal source (voltage controlled oscillator) and delayed by different amounts because of two different paths. A first path is from the transducer to the surface of a sample and back, and a second path is from the transducer to the opposite surface and back. A first pulse phase locked loop including a phase detector and a phase shifter forces the tone burst signals delayed by the second path in phase quadrature with the periodic signal source. A second pulse phase locked loop including a second phase detector forces the tone burst signals delayed by the first path into phase quadrature with the phase shifted periodic signal source.

COMPARATOR WITH NOISE SUPPRESSION

An apparatus for generating a single pulse the first time only that a noisy cyclic signal exceeds a reference level during a half-cycle is disclosed. For the positive half of a cycle of the noisy cyclic signal, a comparator 12 and a multivibrator 14 produce a fixed voltage output when the noisy cyclic signal first exceeds the reference level. A multivibrator 23 stops the production of the fixed voltage output when the noisy cyclic signal passes the zero voltage level in the negative direction. Consequently, a single pulse is generated indicating that the signal exceeded the reference level during that half-cycle.

PRECISION TUNABLE RESONANT MICROWAVE CAVITY

A tunable microwave cavity containing ionizable metallic vapor or gases and an apparatus for precisely positioning a microwave coupling tip in the cavity and for precisely adjusting at least one dimension of the cavity are disclosed. With this combined structure, resonance may be achieved with various types of ionizable gases. A coaxial probe extends into a microwave cavity through a tube. One end of the tube is retained in a spherical joint attached in the cavity wall. This allows the coaxial probe to be pivotally rotated. The coaxial probe is slideable within the tube thus allowing the probe to be extended toward or retracted from the center of the cavity. A tunable wall in the cavity is precisely positioned by a plurality of threaded rods extending through threaded bushings which are geared together. Thus, rotation of one of the bushings caused rotation of the other bushings simultaneously whereby the tuning wall is accurately positioned. Means are provided for moving the tube through which the coaxial probe extends in both a side to side and back and forth motion.
A processing circuit is provided for correcting for input parameter variations, such as data and clock signal asymmetry, phase offset and jitter, noise and signal amplitude, in incoming data signals. An asymmetry corrector circuit performs the correcting function and furnishes the corrected data signals to a convolutional encoder circuit. The corrector circuit further forms a regenerated clock signal from clock pulses in the incoming data signals and another clock signal at a multiple of the incoming clock signal. These clock signals are furnished to the encoder circuit so that encoded data may be furnished to a modulator at a high data rate for transmission.

A direct band-gap semiconductor is exposed to intensity-modulated photon radiation having a characteristic energy at least as great as the energy gap of the semiconductor. This produces a time-dependent concentration of excess charge carriers through the material, producing a luminescence signal modulated at the same frequency as the incident radiation but shifted in phase by an amount related to the lifetime of minority carriers. In a preferred embodiment, the phase shift of the luminescence signal is determined by transforming it to a modulated electrical signal and mixing the electrical signal with a reference signal modulated at the same frequency and having a phase which is known relative to the incident radiation. Minority carrier lifetime is calculated by integrating a direct current component of the mixed signal (F sub dc) over a 2π range in phase of the reference signal.
Power is extracted from plasmons, photons, or other guided electromagnetic waves at infrared to miduv frequencies by inelastic tunneling in metal-insulator-semiconductor-metal diodes. Inelastic 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 metal layers which are at higher potential. The diode voltage determines the fraction of energy extracted from the plasmons, any excess is lost to heat.
35 INSTRUMENTATION AND PHOTOGRAPHY

INSTRUMENTATION AND PHOTOGRAPHY

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

N85-20294* National Aeronautics and Space Administration
Goddard Space Flight Center, Greenbelt, Md
PORTABLE PALLET WEIGHING APPARATUS Patent
(NASA-CASE-GSC-12789-1, NAS 1 71 GSC-12789-1,
US-PATENT-CLASS-177-147, US-PATENT-CLASS-177-260,

An assembly for use with several like units in weighing the mass of a loaded cargo pallet supported by its trunnions has a bridge frame for positioning the assembly on a transportation frame carrying the pallet while straddling one trunnion of the pallet and its trunnion lock, and a cradle assembly for incrementally raising the trunnion. The mass at the trunnion is carried as a static load by a slidable bracket mounted upon the bridge frame for supporting the cradle assembly. The bracket applies the static loading to an electrical load cell symmetrically positioned between the bridge frame and the bracket. The static loading compresses the load cell, causing a slight deformation and a potential difference at the load cell terminals which is proportional in amplitude to the mass of the pallet at the trunnion. R J F

N85-20297* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
LIQUID THICKNESS GAGE Patent Application
L M WEINSTEIN, inventor (to NASA) 20 Dec 1984 11 p
(NASA-CASE-LAR-13342-1, NAS 1 71 LAR-13342-1,
US-PATENT-APPL-SN-684186) Avail NTIS HC A02/MF A01 CSCL 14B

A method and apparatus to measure the thickness of liquid independent of liquid conductivity are disclosed. Two pairs of round, corrosion resistant wire are mounted in an insulating material such that the cross-sectional area of each wire is flush with and normal to the surface. The resistance between each pair of wires is measured using two AC resistance measuring circuits. The ratio of the outputs of the two resistance measuring circuits is indicative of the thickness of the liquid on the surface. NASA

N85-20298* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
ANGULAR MEASUREMENT SYSTEM Patent Application
J R CURRIE and R KISSEL, inventors (to NASA) 3 Oct 1984 13 p
(NASA-CASE-MFS-25825-1, NAS 1 71 MFS-25825-1,
US-PATENT-APPL-SN-657309) Avail NTIS HC A02/MF A01 CSCL 14B

A system for the measurement of shaft angles is disclosed wherein a synchro resolver is sequentially pulsed, and alternately, a sine and then a cosine representative voltage output of it are sampled. Two like type, sine or cosine, succeeding outputs (V
sub $S_1, V_{sub 82}$) are averaged and algebraically related to the opposite type output pulse ($V_{sub c}$) occurring between the averaged pulses to provide a precise indication of the angle of a shaft coupled to the resolver at the instant of the occurrence of the intermediately occurring pulse ($V_{sub c}$) NASA

N85-20299*# National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
EMITTED VIBRATION MEASUREMENT DEVICE AND METHOD
Patent Application
G L GISLER, inventor (to NASA) (Sperry Corp., Phoenix, Ariz)
3 Oct 1984 17 p
(NASA-CASE-MFS-25981-1, NAS 1 71 MFS-25981-1,
US-PATENT-APPL-SN-657310) Avail NTIS HC A02/IMF A01
CSCL 14B

This invention is directed to a method and apparatus for measuring emitted vibrational forces produced by a reaction wheel assembly due to imbalances, misalignment, bearing defects and the like. The apparatus includes a low mass carriage supported on a large mass base. The carriage is in the form of an octagonal frame having an opening which is adapted for receiving the reaction wheel assembly supported thereon by means of a mounting ring. The carriage is supported on the base by means of air bearings which support the carriage in a generally frictionless manner when supplied with compressed air from source. A plurality of carriage brackets and a plurality of base blocks provide for physical coupling of the base and carriage. The sensing axes of the load cells are arranged generally parallel to the base and connected between the base and carriage NASA

N85-20300*# National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala.
ADJUSTABLE INDICATING DEVICE FOR LOAD POSITION
Patent Application
C HELLER, inventor (to NASA) 20 Dec 1984 10 p
(NASA-CASE-MFS-28008-1, NAS 1 71 MFS-28008-1,
US-PATENT-APPL-SN-664194) Avail NTIS HC A02/IMF A01
CSCL 14B

An indicating device designed to provide an electrical signal relative to the position of a load is described. The device has a central housing with two wing structures on each side which support conventional switch means having cantilevered arms. Extending through the housing is a movable shaft that is spring biased to a forward extended position and adapted to respond against a load being positioned. The rear end of the movable shaft has an adjustable cam means which acts upon the cantilevered arms to cause a switching action upon shifting of the movable shaft by a load NASA

N85-20301*# National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex
SOLID SORBENT AIR SAMPLER Patent Application
T J GALEN, inventor (to NASA) (Northrop Services, Inc., Los Angeles) 10 Oct 1984 19 p
(NASA-CASE-MSC-20653-1, NAS 1 71 MSC-20653-1,
US-PATENT-APPL-SN-659474) Avail NTIS HC A02/IMF A01
CSCL 14B

A fluid sampler for collecting a plurality of discreet samples over separate time intervals is presented. The sampler comprises a sample assembly with an inlet and a plurality of discreet sample tubes each of which has an inlet and outlet sides. A multiprot dual acting valve is provided in the sampler to sequentially pass air from the sample inlet into the selected sample tubes. The sample tubes extend longitudinally from the housing and are located at its outer periphery so that upon removal of an enclosure cover, they are readily accessible for analytical operation of the sampler NASA
35 INSTRUMENTATION AND PHOTOGRAPHY

N85-21595* National Aeronautics and Space Administration
Lyndon B. Johnson Space Center, Houston, Tex
SELF-CHARGING METERING AND DISPENSING DEVICE FOR FLUIDS Patent
Supersedes N83-17856 (21 - 08, p 1184 I) Sponsored by NASA
(NASA-CASE-MSC-20275-1, NAS 171 MSC-20275-1,
Avail. US Patent and Trademark Office CSCL 14B
A self-metering and dispensing device for fluids obtained from a pressurized fluid supply is discussed. Tubing and valving means permit the introduction of fluid into and discharge from a closed cylindrical reservoir. The reservoir contains a slideably disposed piston co-acting with a coil compression spring, with piston travel determining the amount of fluid in the reservoir. Once the determined amount of fluid is introduced into the reservoir, the fluid is discharged by the force of the coil compression spring acting upon the piston.

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N85-21596* National Aeronautics and Space Administration
Pasadena Office, Calif
STATE-OF-CHARGE COULOMETER Patent
J J ROWLETTE, inventor (to NASA) (JPL, California Inst of Tech., Pasadena) 12 Feb 1985 15 p Filed 1 Jun 1983
Supersedes N83-29595 (21 - 16, p 2929) Sponsored by NASA
(NASA-CASE-NPO-15027-1, NAS 171 NPO-15027-1,
Avail. US Patent and Trademark Office CSCL 14B
A coulometer for accurately measuring the state-of-charge of an open-cell battery utilizing an aqueous electrolyte, includes a current meter for measuring the battery/discharge current and a flow meter for measuring the rate at which the battery produces gas during charge and discharge. Coupled to the flow meter is a gas analyzer which measures the oxygen fraction of the battery gas. The outputs of the current meter, flow meter, and gas analyzer are coupled to a programmed microcomputer which includes a CPU and program and data memories. The microcomputer calculates that fraction of charge and discharge current consumed in the generation of gas so that the actual state-of-charge can be determined. The state-of-charge is then shown on a visual display.

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

N85-21597* National Aeronautics and Space Administration
Pasadena Office, Calif
CARBON GRANULE PROBE MICROPHONE FOR LEAK DETECTION Patent
S P PARThASARATHY, inventor (to NASA) (JPL, California Inst of Tech., Pasadena) 12 Feb 1985 5 p Filed 1 Jun 1983
Supersedes N83-29595 (21 - 16, p 2929) Sponsored by NASA
(NASA-CASE-NPO-15027-1, NAS 171 NPO-15027-1,
Avail. US Patent and Trademark Office CSCL 14B
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 is located in the tube adjacent the carbon granules and 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.

Official Gazette of the U.S. Patent and Trademark Office
THIN FILM STRAIN TRANSDUCER Patent


A strain transducer system and process for making same is disclosed wherein a beryllium-copper ring having four strain gages disposed thereon is electrically connected in Wheatstone bridge fashion to output instrumentation Tabs are bonded to a balloon or like surface with strain on the surface causing bending of the ring and providing an electrical signal through the gages proportional to the surface strain A figure is provided which illustrates a pattern of a one-half ring segment as placed on a sheet of beryllium-copper for chem-mill etch formation, prior to bending and welding of a pair of the segments to form a ring structure

A TWO-AXIS, SELF-NULLING SKIN FRICTION BALANCE Patent Application


A skin friction force measuring device is described which is comprised of a first pivoted L shaped arm, a second arm pivoted on one end of the L shaped arm with a sensing element attached to an end of the second arm. In response to skin friction forces on the sensing element the arms are pivoted about the two pivots and two nulling means force the pivots back to their zero position. The outputs of the two nulling means are indicative of the skin friction forces along two perpendicular axes in the plane of the sensing element

A PORTABLE REMOTE LASER SENSOR FOR METHANE LEAK DETECTION Patent


A portable laser system for remote detection of methane gas leaks and concentrations is disclosed. The system transmitter includes first and second 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 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. 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.

METHOD OF AND APPARATUS FOR MEASURING TEMPERATURE AND PRESSURE Patent
C L KORB and J E KALSHOVEN, JR, inventors (to NASA) 15 Jan 1985 17 p Filed 28 May 1982 Supersedes N82-29580 (20 - 20, p 2829)

(LINEAR MAGNETIC BEARINGS Patent
Avail US Patent and Trademark Office CSCL 131

SLOW OPENING VALVE Patent
Avail US Patent and Trademark Office CSCL 13K

A valve control is described having a valve body with an actuator stem and a rotating handle connected to the actuator stem by a differential drive mechanism which, during uniform movement of the handle in one direction, initially opens the valve at a relatively slow rate and, thereafter, complete the valve movement at a substantially faster rate. A series of stop rings are received about
the body in frictional abutting relationship and serially rotated by the handle to uniformly resist handle movement independently of the extent of handle movement.

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

N85-20377*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio.
VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS Patent Application
E DIRUSSO, inventor (to NASA) 16 Nov 1984 8 p
(NASA-CASE-LEW-14170-1, NAS 1 71 LEW-14170-1,
US-PATENT-APPL-SN-672224) Avail NTIS HC A02/MF A01
CSCL 11A
Vibration and stability of a primary seal ring are controlled by a secondary seal system. An inflatable bladder which forms a portion of the secondary seal vanes the damping applied to the seal ring. The amplitude of vibration of the primary seal ring is sensed with a proximity probe that is connected to a microprocessor in a control system. The bladder pressure is changed by the control system to mitigate any sensed instability or vibration.

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

N85-20378*# National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala.
TUBE COUPLING DEVICE Patent Application
W N MEYERS and L A HEIN, inventors (to NASA) 18 Jan 1985 12 p
(NASA-CASE-MFS-25964-1, NAS 1 71 MFS-25964-1,
US-PATENT-APPL-SN-692801) Avail NTIS HC A02/MF A01
CSCL 13K
A first annular ring has a keyed opening sized to fit around the nut region of a male coupling and a second annular ring has a keyed opening sized to fit around the female nut of a coupling. Each ring has mating ratchet teeth and these rings are biased together, thereby engaging these teeth and preventing rotation of these rings. This in turn prevents the rotation of the male nut region with respect to the female nut. For tube-to-bulkhead locking, one facet of one ring is notched, and a pin is pressed into an opening in the bulkhead. This pin is sized to fit within one of the notches in the ring thereby preventing rotation of this ring with respect to the bulkhead.

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N85-21649* National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex.
CONNECTION SYSTEM Patent
B MCCANDLESS, II, inventor (to NASA) 20 Nov 1984 9 p
Filed 30 Jun 1982 Supersedes N82-31689 (20 • 22, p 3137)
(NASA-CASE-MSC-20319-1, NAS 1 71 MSC-20319-1,
US-PATENT-4,483,639, US-PATENT-APPL-SN-393582,
CSCL 13I
A mechanical connection system comprises a first body defining a receptacle and a second body defining a pin matingly receivable in the receptacle by relative movement in a first directional mode. A primary latch is engageable between the two bodies to retain the pin in the receptacle. The primary latch is reciprocable in a second directional mode transverse to the first directional mode. A lock member carried by one of the bodies is operatively associated with the primary latch and movable, transverse to the second directional mode, between a locking position maintaining engagement of the primary latch and a releasing position permitting release of the primary latch. The lock includes an operator portion engageable to move the lock member from its locking position to its releasing position. The operator is located internally of the first body. An actuator is selectivity insertable into and disengageable from the first body. The actuator is movable relative to the first body when it is inserted for engagement with and operation of the operator.

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An improved method for simultaneously slicing one or a multiplicity of boules of silicon into silicon wafers is described. A plurality of vertical stacks of horizontal saw blades of circular configuration are arranged in juxtaposed coaxial alignment. Each blade is characterized by having a cutting diameter slightly greater than the cutting diameter of the blade arranged immediately above, imparting a simultaneous rotation to the blades.

A reusable metal clamp for retaining a fused quartz ampoule during temperature cycling in the range of 20 deg C to 1000 deg C is described. A compressible graphite foil having a high radial coefficient of thermal expansion is interposed between the fused quartz ampoule and metal clamp to maintain a snug fit between these components at all temperature levels in the cycle.

An apparatus and method is disclosed for keeping interior walls of a reaction vessel free of undesirable deposits of solid materials in gas-to-solid reactions. The apparatus includes a movable cleaning head which is configured to be substantially complementary to the interior contour of the walls of the reaction vessel. The head ejects a stream of gas with a relatively high velocity into a narrow space between the head and the walls. The head is moved substantially continuously to at least intermittently blow the stream of gas to substantially the entire surface of the walls wherein undesirable solid deposition is likely to occur. The disclosed apparatus and process is particularly useful for keeping the walls of a free-space silane-gas-to-solid-silicon reactor free of undesirable silicon deposits.

Includes remote sensing of earth resources by aircraft and spacecraft, photogrammetry, and aerial photography.
received signals are fed to several channels which are tuned to separate selected frequencies. Their outputs are fed to a processor with a memory for storage. As the antenna points to pixels within a calibration area around a buoy of known coordinates, signals are likewise received and stored. Exactly measured sea temperature is received from the buoy. After passing over several calibration areas, a forward stepwise regression analysis is performed to produce an expression which selects the significant from the insignificant channels and assigns weights (coefficients) to them. The expression is used to determine the sea temperature at each pixel based on the signals received therefrom. Wind temperature, pressure, and wind speed at each pixel can also be calculated.

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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.

N85-20530* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
SCREEN PRINTED INTERDIGITATED BACK CONTACT SOLAR CELL Patent

Interdigitated back contact solar cells are made by screen printing dopant materials onto the back surface of a semiconductor substrate in a pair of interdigitated patterns. These dopant materials are then diffused into the substrate to form junctions having configurations corresponding to these patterns. Contacts having configurations which match the patterns are then applied over the junctions.

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N85-21769* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
SOLAR POWERED ACTUATOR WITH CONTINUOUSLY VARIABLE AUXILIARY POWER CONTROL Patent

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 matching 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.

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N85-20535* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
LITHIUM COUNTERDOPED SILICON SOLAR CELL Patent Application

The resistance to radiation damage of an n(+)p boron doped silicon solar cell is improved by lithium counterdoping. Even though lithium is an n-dopant in silicon, the lithium is introduced in small enough quantities so that the cell base remains p-type. The lithium is introduced into the solar cell wafer by implantation of lithium ions whose energy is about 50 keV. After this lithium implantation, the wafer is annealed in a nitrogen atmosphere at 375 C for two hours.

NASA
A solar powered system is disclosed in which a load such as a compressor is driven by a main induction motor powered by a solar array. An auxiliary motor shares the load with the solar powered motor in proportion to the amount of sunlight available, is provided with a power factor controller for controlling voltage applied to the auxiliary motor in accordance with the loading on that motor. In one embodiment, when sufficient power is available from the solar cell, the auxiliary motor is driven as a generator by excess power from the main motor so as to return electrical energy to the power company utility lines.

A method and apparatus for detecting human eye defects, particularly detection of refractive error is presented. Eye reflex is recorded on color film when the eyes are exposed to a flash of light. The photographs are compared with predetermined standards, to detect eye defects.
54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering, biotechnology; and space suits and protective clothing

N85-20666*# National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
ELBOW AND KNEE JOINT FOR HARD SPACE SUITS AND THE LIKE Patent Application
H C VYKUKAL, inventor (to NASA) 20 Dec 1984 22 p
(NASA-CASE-ARC-11610-1, NAS 1 71 ARC-11610-1,
US-PATENT-APPL-SN-684190) Avail NTIS HC A02/MF A01
CSCL 06K

An elbow or knee joint for a hard space suit or similar usage is formed of three serially-connected rigid sections which have truncated spherical configurations. The ends of each section form solid geometric angles, and the sections are interconnected by hermetically-sealed ball bearings. The outer two sections are fixed together for rotation in a direction opposite to rotation of the center section. A preferred means to make the outer sections track each other in rotation comprises a rotatable continuous chain which engages sockets circumferentially spaced on the facing sides of the outer races of the bearings. The joint has a single pivot point and the bearing axes are always contained in a plane for any articulation of the joint. Thus flexure of the joint simulates the coplanar flexure of the knee or elbow and is not susceptible to lockup.

N85-21987*# National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent Application
H C VYKUKAL, inventor (to NASA) 20 Dec 1984 15 p
(NASA-CASE-ARC-11616-1, NAS 1 71 ARC-11616-1,
US-PATENT-APPL-SN-684193) Avail NTIS HC A02/MF A01
CSCL 06K

A hard suit for use in space or diving applications has an adjustable length torso covering that will fit a large variety of wearers. The upper and lower sections of the covering interconnect so that the covering will fit wearers with short torsos. One or more sizing rings may be inserted between sections to accommodate larger torso sizes as required. Since access of the astronaut to the torso covering is preferably through an opening in the back of the upper section (which is closed off by the backpack), the rings slant upward-forward from the lower edge of the opening. The lower edge of the upper covering section has a coupler which slants upward-forward from the lower edge of the back opening. The lower section has a similarly slanted coupler which may interfit with the upper section coupler to accommodate the smallest torso size. Each ring has an upper coupler which may interfit with the upper section coupler and a lower coupler which may interfit with the lower section coupler.
A Reed-Solomon decoder with dedicated hardware for five sequential algorithms was designed with overall pipelining by memory swapping between input, processing and output memories, and internal pipelining through the five algorithms. The code definition used in decoding is specified by a keyword received with each block of data so that a number of different code formats may be decoded by the same hardware.

A microprocessor system is provided with added memories to expand its address spaces beyond its address word length capacity by using indirect addressing instructions of a type having a detectable operations code and dedicating designated address spaces of memory to each of the added memories, one space to a memory. By decoding each operations code of instructions read from main memory into a decoder to identify indirect addressing instructions of the specified type, and then decoding the address that follows in a decoder to determine which added memory is associated therewith, the associated added memory is selectively enabled through a unit while the main memory is disabled to permit the instruction to be executed on the location to which the effective address of the indirect address instruction points, either before the indirect address is read from main memory or afterwards, depending on how the system is arranged by a switch.
A system is described for acoustically levitating an object within a portion of a chamber that 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 can be telescoped to vary the length ($L_{1}$) of the cold end portion and therefore of the entire chamber, so that the chamber remains resonant to a normal mode frequency, and so that 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, which delivers its output to a control circuit which controls a motor that varies the length ($L$) of the chamber to a level where the sensed acoustic pressure is a maximum.

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An unobscured three mirror wide-angle telescopic imaging system comprised of an input baffle which provides a 20 deg (Y axis) x 301 deg (X axis) field of view, a primary mirror having a convex spherical surface, a secondary mirror having a concave ellipsoidal reflecting surface, and a tertiary mirror having a concave spherical reflecting surface. The mirrors comprise mirror elements which are offset segments of parent mirrors whose axes and vertices commonly lie on the system’s optical axis. An iris diaphragm forming an aperture stop is located between the secondary and tertiary mirror with its center also being coincident with the optical axis and being further located at the beam waist of input light beams reflected from the primary and secondary mirror surfaces. At the system focus, following the tertiary mirror, is located a flat detector which may be, for example, a TV imaging tube or a photographic film. When desirable, a spectral transmission filter is placed in front of the detector in close proximity thereto.

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Includes light phenomena
The problem of GaAs device degradation at cryogenic temperatures at the interface of a GaAs device layer and openings in an overlying SiO2 passivation layer is addressed. This problem is solved by providing a semi-insulating GaAs passivation layer epitaxially grown on the underlying GaAs device layer. This structure provides a lattice-matched passivation layer not subject to severe mechanical stress at cryogenic temperatures.

Crystals of wide band gap materials are produced by positioning a holder receiving a seed crystal at the interface between a body of molten wide band gap material and an overlying layer of temperature-controlled, encapsulating liquid. The temperature of the layer decreases from the crystallization temperature of the crystal at the interface with the melt to a substantially lower temperature at which formation of crystal defects does not occur, suitably a temperature of 200°C to 600°C. After initiation of crystal growth, the leading edge of the crystal is pulled through the layer until the leading edge of the crystal enters the ambient gas headspace which may also be temperature controlled. The length of the column of liquid encapsulant may exceed the length of the crystal such that the leading edge and trailing edge of the crystal are both simultaneously with the column of the crystal. The crystal can be pulled vertically by means of a pulling-rotation assembly or horizontally by means of a low-angle withdrawal mechanism.
NASA SP-7039 (27)

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9. Performing Organization Name and Address  
National Aeronautics and Space Administration  
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12. Sponsoring Agency Name and Address

15. Supplementary Notes

Section 1: Abstracts

16. Abstract

Abstracts are provided for 92 patents and patent applications entered into the NASA scientific and technical information system during the period January 1985 through June 1985. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.

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