NASA

PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Government Information Systems.
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 1981 and July 1981.
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INTRODUCTION

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

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

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

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

The 130 citations published in this issue of the Abstract Section cover the period January 1981 through July 1981. The Index Section references approximately 4000 citations covering the period May 1969 through July 1981.

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
A connector apparatus and assembly is described for connecting beams and the like structural members which is particularly advantageous for connecting two members together when moved laterally into place. The connector apparatus requires no relative longitudinal movement between the ends of the beams or members being connected to make a connection joint. The connector apparatus includes a receptacle member and a connector housing carried by opposed ends of the structural member being connected wherein a spring-loaded connector member is carried by the connector housing which may be released for extension and engagement into the receptacle member.
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 inventions(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

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

NASA patent application specifications are sold in paper copy by the National Technical Information Service at price code A02 ($5.00 domestic; $10.00 foreign). Microfiche are sold at price code A01 ($3.50 domestic; $7.00 foreign). The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

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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-4, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the U.S. Patent Number or the U.S. Application Serial Number assigned to the invention as shown in NASA PAB.

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

Title 14—AERONAUTICS AND SPACE

Chapter V—National Aeronautics and Space Administration

PART 1245—PATENTS

Subpart 2—Patent Licensing Regulations

1. Subpart 2 is revised in its entirety as follows:

Sec.
1245.200 Scope of subpart.
1245.201 Definitions.
1245.202 Basic considerations.
1245.203 Licenses for practical application of inventions.
1245.204 Other licenses.
1245.205 Application of NASA inventions available for license.
1245.206 Application for nonexclusive license.
1245.207 Application for exclusive license.
1245.208 Processing applications for license.
1245.209 Royalties and fees.
1245.210 Reports.
1245.211 Revocation of licenses.
1245.212 Party status of licensees.
1245.213 Litigation.
1245.214 Address of communications.

Authority: The provisions of this Subpart 2 issued under 42 U.S.C. 2457, 2473(b)(3).

§ 1245.200 Scope of subpart.

This Subpart 2 prescribes the terms, conditions, and procedures for licensing inventions covered by U.S. patents and patent applications for which the Administrator of the National Aeronautics and Space Administration holds title on behalf of the United States.

§ 1245.201 Definitions.

For the purpose of this subpart, the following definitions apply:

(a) "Invention" means an invention covered by a U.S. patent or patent application for which the Administrator of the National Aeronautics and Space Administration holds title on behalf of the United States and which is designated by the Administrator as appropriate for the grant of license(s) in accordance with this subpart.

(b) "Practical application" means to make or have made, use or have used, sell or have sold, or otherwise dispose of according to law any machine, article of manufacture or composition of matter physically embodying the invention, or to use or have used the process or method comprising the invention.

(c) "Patent application" means the manufacture in the case of a composition of matter or product, the use in the case of a process, or the operation in the case of a machine, under such conditions as to establish that the invention is being utilized and that its benefits are reasonably accessible to the public.

(d) "Special invention" means any invention designated by the NASA Assistant General Counsel for Patent Matters to be subject to short-form licensing procedures. An invention may be designated as a special invention when a determination is made that—

(1) Practical application has occurred and is likely to continue for the life of the patent and for which an exclusive license is not in force, or

(2) The public interest would be served by the expeditious granting of a nonexclusive license for practice of the invention by the public.

(e) The "Administrator" means the Administrator of the National Aeronautics and Space Administration, or his designee.

(f) "Government" means the Government of the United States of America.

(g) The "Inventions and Contributions Board" means the NASA Inventions and Contributions Board established by the Administrator of NASA within the Administration in accordance with section 305 of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).

§ 1245.202 Basic considerations.

(a) Much of the new technology resulting from NASA-sponsored research and development in aeronautical and space activities has application in other fields. NASA has special authority under the National Aeronautics and Space Act of 1958, as amended (42 U.S.C. 2451), to provide for the widest practical dissemination and utilization of this new technology. In addition, NASA has been given unique requirements to protect the inventions resulting from NASA activities and to promulgate licensing regulations to encourage commercial use of these inventions.

(b) NASA-owned inventions will best serve the interests of the United States when they are brought to practical application in the shortest time possible. Although NASA encourages the nonexclusive licensing of its inventions to promote competition and achieve their widest possible utilization, the commercial development of certain inventions calls for a substantial capital investment which private manufacturers may be unwilling to risk under a nonexclusive license. The policy of NASA to seek exclusive licensees when such licenses will provide the necessary incentive to the licensee to achieve the practical application of the invention.

(c) The Administrator, in determining whether to grant an exclusive license, will evaluate all relevant information submitted by applicants and all other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, their proposed plans to undertake the required investment and development, the impact on competitors, and the benefits of the license to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

(d) The license may be granted for all or less than all fields of use of the invention and throughout the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

(2) The duration of the license shall be for a period as specified in the license.

(3) The license shall require the licensee to achieve the practical application of the invention and to then practice the invention for the duration of the license.

(e) Licensees in the United States shall be given priority to licensees outside the United States, to licensees in the United States, to licensees in the United States and its territories and possessions, and to the public.

(f) Licensees in the United States shall be given priority to licensees outside the United States, to licensees in the United States, and to the public.

(2) The administrator shall extend to the licensees other than the public, the exclusive right to practice the invention, to grant licenses under the exclusive license, and to sue the public for violation of the exclusive license.

(g) Exclusive licenses may be granted to exclude the public from the practice of the invention, to exclude the public from the practice of the invention, and to exclude the public from the practice of the invention.

(h) The Administrator shall be given priority to licensees within the United States, to licensees in the United States, and to the public.

(i) The administrator shall extend to the licensees other than the public, the exclusive right to practice the invention, to grant licenses under the exclusive license, and to sue the public for violation of the exclusive license.

(j) Exclusive licenses may be granted to exclude the public from the practice of the invention, to exclude the public from the practice of the invention, and to exclude the public from the practice of the invention.
§ 1245.205 listing the invention as available for licensing has been published in the Federal Register for at least 9 months; or a patent covering the invention has been issued for at least 6 months, or a limited exclusive license may be granted prior to the periods specified above if the Administrator determines that the public interest will best be served by the earlier grant of an exclusive license.

(2) The license may be granted for all or less than all fields of use of the invention, and throughout the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

(3) The exclusive period of the license shall be negotiated, but shall be for less than the terminal portion of the patent, and shall be related to the period necessary to provide a reasonable incentive to invest the necessary risk capital.

(4) The license shall require the licensee to practice the invention within a period specified in the license and then to transfer the practical application of the invention.

(5) The license shall require the licensee to expend a specified minimum sum and to perform such acts if the applicant considers necessary to achieve the practical application of the invention.

(6) The license shall be subject to at least an irrevocable royalty-free right of the Government of the United States to practice the invention, together with the right to grant sublicenses of the same scope to the extent the contractor was legally obligated to do so at the time the contract was awarded. Such license and right is nontransferable except to the successor of that part of the contractor's business to which the invention pertains.

(7) The license may reserve to the Administrator, NASA, under the following circumstances, the right to require the granting of a sublicense to responsible applicant(s) on terms that are consistent with the license:

(a) License to contractor. There is hereby granted to the contractor reporting an invention made in the performance of work under a contract of NASA in the manner specified in section 305(a) (1) or (2) of the National Aeronautics and Space Act of 1958 as amended, 42 U.S.C. 2451 (a) (1) or (2), a revocable, nonexclusive, royalty-free license to the practice of such invention, together with the right to grant sublicenses of the same scope to the extent the contractor was legally obligated to do so at the time the contract was awarded. Such license and right is nontransferable except to the successor of that part of the contractor's business to which the invention pertains.

(b) Miscellaneous licenses. Subject to any other licensing policies, subsections (a) through (d) of this part 1245 shall require the Administrator to grant licenses granted by an exclusive licensee on terms that are consistent with the license, and to negotiate, but shall be for less than the terminal portion of the patent, shall be subject to at any time. An application for exclusive license shall be addressed to the NASA Assistant General Counsel for Patent Matters.

(c) Contents of an application for a short-term nonexclusive license under § 1245.203 (c) for a special invention shall include:

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

(2) Name and address of company or organization applying for license; and

(3) Any other facts which the applicant believes to show it to be in the interest of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive license.

§ 1245.207 Application for exclusive license.

(4) A statement indicating the amount of royalty fees or other consideration, if any, the applicant would be willing to pay to the Government for the exclusive license; and

(5) Any other facts which the applicant believes to show it to be in the interest of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive license.

(6) The license shall be nontransferable except to the successor of that part of the license's business to which the invention pertains.

(7) Subject to the approval of the Administrator, the license may grant sublicenses under the license. Each sublicense granted by an exclusive licensee shall make reference to and shall provide that the sublicense is subject to the terms of the exclusive license including the rights retained by the Government under the exclusive license. A copy of each sublicense shall be furnished to the Administrator.

(8) The license may be subject to such other reservations as may be in the public interest.
PATENT LICENSING REGULATIONS

cense and that such an exclusive license should be granted to the applicant.
§ 1245.208 Processing applications for licenses.

(a) Initial review. Applications for nonexclusive and exclusive licenses under §§ 1245.206 and 1245.207 will be reviewed by the Patent Counsel of the NASA Installation having cognizance for the invention and the NASA Assistant General Counsel for Patent Matters, to determine the conformity and appropriateness of the application and the availability of the specific invention for the license requested. The Assistant General Counsel for Patent Matters will forward all applications for license conforming to §§ 1245.206(b) and 1245.207(b) to the NASA Inventions and Contributions Board when the invention is available for consideration of the requested license. Prior to forwarding applications for exclusive licenses to the Inventions and Contributions Board, notice in writing will be given to each nonexclusive licensee for the specific invention advising of the receipt of the application. The application providing each nonexclusive licensee with a 30-day period for submitting either evidence that practical application of the invention has occurred or is about to occur or, an application for an exclusive license for the invention.

(b) Recommendations of Inventions and Contributions Board. The Inventions and Contributions Board shall, in accordance with the basic considerations set forth in §§ 1245.202 and 1245.203, evaluate all applications for license forwarded by the Assistant General Counsel for Patent Matters. Based upon the facts presented to the Inventions and Contributions Board in the application and any other facts in its possession, the Inventions and Contributions Board shall recommend to the Administrator: (1) Whether a nonexclusive or exclusive license should be granted, (2) the identity of the license, and (3) any special terms or conditions of the license.

(c) Determination of Administrator and grant of nonexclusive licenses. The Administrator shall review the recommendations of the Inventions and Contributions Board and shall determine whether to grant the nonexclusive license as recommended by the Board. If the Administrator determines to grant the license, the license will be granted upon the negotiation of the appropriate terms and conditions of the Office of General Counsel.

(d) Determination of Administrator and grant of exclusive licenses. (1) Notice. If the Administrator determines that the best interest of the United States will be served by the granting of an exclusive license in accordance with the basic considerations set forth in §§ 1245.202 and 1245.203, a notice shall be published in the Federal Register. Upon announcement of intent to grant the exclusive license, the identification of the invention, special terms or conditions of the proposed license, and a statement that NASA will grant the exclusive license unless within 30 days of the publication of such notice the Inventions and Contributions Board receives in writing any of the following together with supporting documentation: (i) A statement from any person setting forth reasons why it would not be in the best interest of the United States to grant the proposed exclusive license; or (ii) An application for a nonexclusive license under such invention, in accordance with § 1245.206(b), in which applicant states whether it is likely or is likely to bring the invention to practical application within a reasonable period.

The Inventions and Contributions Board shall, upon receipt of a written request within the 30 days' notice period, grant an extension of 30 days for the submission of the documents designated above. After a hearing, the Inventions and Contributions Board shall review all written responses and determine whether the license should be revoked.

(e) Revocation of licenses. (a) An exclusive license may be revoked, either in part or in its entirety, by the Administrator if in his opinion such revocation is necessary to achieve the earliest practical application of the invention pursuant to an application for exclusive license submitted in accordance with § 1245.207, or the licensee at any time shall breach any covenant or agreement contained in the license, and shall fail to remedy any such breach within 30 days after written notice thereof.

(b) Any license granted pursuant to § 1245.204(a) may be revoked, either in part or in its entirety, by the Administrator if in his opinion such revocation is necessary to achieve the earliest practical application of the invention pursuant to an application for exclusive license submitted in accordance with § 1245.207, or the licensee at any time shall breach any covenant or agreement contained in the license, and shall fail to remedy any such breach within 30 days after written notice thereof.

(c) Before revoking any license granted pursuant to this Subpart 2 for breach of a covenant or agreement, the Administrator shall furnish the licensee a written notice of intention to revoke the license, and the licensee will be allowed 30 days after such notice in which to appeal such revocation by filing before the Inventions and Contributions Board on the question of revocation. After a hearing, the Inventions and Contributions Board shall transmit to the Administrator the record of proceedings, its findings of fact, and its recommendations for the amount of the license which the Administrator should be granted either in part or in its entirety. The Administrator shall review the recommendation of the Board and determine whether to revoke the license in part or in its entirety. Revocation of a license shall include revocation of all sublicences which have been granted.

§ 1245.211 Royalties and fees.

(a) Normally, a nonexclusive license for the practical application of an invention granted to a U.S. citizen or company will not require the payment of royalties; however, NASA may require other consideration.

(b) An exclusive license for an invention may provide for the payment of royalties, fees or other consideration when the licensing circumstances and the basic considerations in § 1245.202, considered together, indicate that it is in the public interest to do so.

§ 1245.210 Reports.

A license shall require the licensee to submit periodic reports of his efforts to work the invention. The reports shall contain information within his knowledge, or which he may acquire under normal business practice, pertaining to the commercial use that is being made of the invention and such other information which the Administrator may determine pertinent to the licensing program and which is specified in the license.

§ 1245.211 Revocation of licenses.

(a) Any license granted pursuant to § 1245.203 may be revoked, either in part or in its entirety, by the Administrator if in his opinion such revocation is necessary to achieve the earliest practical application of the invention in accordance with the terms of the license, or if the licensee at any time shall fail to use adequate efforts to bring to or achieve practical application of the invention in accordance with the terms of the license, or if the licensee at any time shall fail in making any report required by the license, or shall make any false report, or shall commit any breach of any covenant or agreement therein contained, and shall fail to remedy any such default, false report, or breach within 30 days after written notice, or if the patent is deemed unenforceable either by the Attorney General or a final decision of a U.S. court.

(b) Any license granted pursuant to § 1245.204(a) may be revoked, either in part or in its entirety, by the Administrator if in his opinion such revocation is necessary to achieve the earliest practical application of the invention pursuant to an application for exclusive license submitted in accordance with § 1245.207, or the licensee at any time shall breach any covenant or agreement contained in the license, and shall fail to remedy any such breach within 30 days after written notice thereof.

(c) Before revoking any license granted pursuant to this Subpart 2 for breach of a covenant or agreement, the Administrator shall furnish the licensee a written notice of intention to revoke the license, and the licensee will be allowed 30 days after such notice in which to appeal such revocation by filing before the Inventions and Contributions Board on the question of revocation. After a hearing, the Inventions and Contributions Board shall transmit to the Administrator the record of proceedings, its findings of fact, and its recommendations for the amount of the license which the Administrator should be granted either in part or in its entirety. Revocation of a license shall include revocation of all sublicences which have been granted.

§ 1245.212 Appeals.

Any person desiring to file an appeal pursuant to § 1245.211(c) shall address the appeal to Chairman, Inventions and Contributions Board. Any person filing an appeal shall be afforded an opportunity to be heard and to present evidence in support of his appeal. The procedures to be followed in any such appeal shall be determined by the Administrator. The Board shall make findings of fact and recommendations with respect to disposition of the appeal. The decision on the appeal shall be made by the Administrator, and such decision shall be final and conclusive, except on questions of law, unless determined by a court of competent jurisdiction to have been fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence.

§ 1245.213 Litigation.

An exclusive licensee shall be granted the right to sue at his own expense any party who infringes the rights set forth in his license and covered by the licensed patent. The licensee may join the Government, upon consent of the Attorney General, as a party complainant in such suit, but with expense to the Government, upon consent of the Attorney General, as a party complainant in such suit, and any final judgment or decree that may be rendered against the Govern-
remedies in such suit. The Government shall also have an absolute right to intervene in any such suit at its own expense. The licensee shall be obligated to promptly furnish to the Government, upon request, copies of all pleadings and other papers filed in any such suit and of evidence adduced in proceedings relating to the licensed patent including, but not limited to, negotiations for settlement and agreements settling claims by a licensee based on the licensed patent, and all other books, documents, papers, and records pertaining to such suit. If, as a result of any such litigation, the patent shall be declared invalid, the licensee shall have the right to surrender his license and be relieved from any further obligation thereunder.

§ 1245.214 Address of communications.
(a) Communications to the Assistant General Counsel for Patent Matters in accordance with §§ 1245.206 and 1245.207 and requests for information concerning licenses for NASA inventions should be addressed to the Assistant General Counsel for Patent Matters, Code GP, National Aeronautics and Space Administration, Washington, D.C. 20546.
(b) Communications to the Inventions and Contributions Board in accordance with §§ 1245.208, 1245.211, and 1245.212 should be addressed to Chairman, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, D.C. 20546.

Effective date. The regulations set forth in this subpart 2 are effective April 1, 1972.

JAMES C. FLETCHER,
Administrator.

FOREIGN PATENT LICENSING REGULATIONS

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

Section 1 • Abstracts

## AERONAUTICS

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

For related information see also Astronautics.

### 01 AERONAUTICS (GENERAL)

N.A.

### 02 AERODYNAMICS

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

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

### 03 AIR TRANSPORTATION AND SAFETY

N.A.

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also 16 Space Transportation and 85 Urban Technology and Transportation.

### 04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also 17 Spacecraft Communications, Command and Tracking and 32 Communications.

### 05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

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

### 06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

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

### 07 AIRCRAFT PROPULSION AND POWER

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

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

### 08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

### 09 RESEARCH AND SUPPORT FACILITIES (AIR)

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

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

## 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.

For extraterrestrial exploration see 91 Lunar and Planetary Exploration.

### 13 ASTRODYNAMICS

N.A.

Includes powered and free-flight trajectories; and orbit and launching dynamics.

### 14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

N.A.

Includes launch complexes; research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also 09 Research and Support Facilities (Air).

### 15 LAUNCH VEHICLES AND SPACE VEHICLES

N.A.

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

### 16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also 03 Air Transportation and Safety and 85 Urban Technology and Transportation.

### 17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

N.A.

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

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

### 18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance and 39 Structural Mechanics.
19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also 06 Aircraft Instrumentation and 35 Instrumentation and Photography.

20 SPACECRAFT PROPULSION AND POWER N.A.
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, and 44 Energy Production and Conversion.

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 N.A.
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 7
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also 77 Thermodynamics and Statistical Physics.

26 METALLIC MATERIALS 9
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 9
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 11
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) 12
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 14
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 15
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

34 FLUID MECHANICS AND HEAT TRANSFER 20
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.

35 INSTRUMENTATION AND PHOTOGRAPHY 21
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 24
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 25
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.

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 29
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 29
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 N.A.
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see 93 Space Radiation.

47 METEOROLOGY AND CLIMATOLOGY 31
Includes weather forecasting and modification.

48 OCEANOGRAPHY N.A.
Includes biological, dynamic and physical oceanography; and marine resources.

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

51 LIFE SCIENCES (GENERAL) 32
Includes genetics.

52 AEROSPACE MEDICINE 32
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 33
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 33
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 34
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 34
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 37
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.

78 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.

79 Social Sciences (General) N.A.
Includes educational matters.

80 Administration and Management N.A.
Includes management planning and research.

81 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.

82 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.

86 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

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
**AERODYNAMICS**

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

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

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**SYSTEM FOR REFURBISHING AND PROCESSING PARACHUTES Patent**

Russell T. Crowell. inventor (to NASA) Issued 30 Sep. 1980


A method for refurbishing and processing parachutes is disclosed including an overhead monorail conveyor system on which the parachute is suspended for horizontal conveyance. The parachute is first suspended in partially open tented configuration wherein open inspection of the canopy is permitted. The parachute is transported by the monorail conveyor to a washing and drying station. Following drying of the parachute, the parachute is conveyed into an interior space where it is finally inspected and removed from the monorail conveyor and laid upon a table for folding. Following folding operations, the parachute is once again mounted on the conveyor in an elongated horizontal configuration and conveyed to a packing area for stowing the parachute in a deployment bag.

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

**AERODYNAMIC SIDE-FORCE ALLEVIATOR MEANS Patent**

Dhanvada M. Rao, inventor (Old Dominion Univ.) Issued 30 Sep. 1980 7p Filed 12 Mar. 1979 Supersedes N79-17813 (17 - 09. p 1072) Sponsored by NASA


An apparatus for alleviating high angle of attack side force on slender pointed cylindrical forebodies such as fighter aircraft, missiles and the like is described. A symmetrical pair of helical separation trips was employed to disrupt the leeside vortices normally attained. The symmetrical pair of trips starts at either a common point or at space points on the upper surface of the forebody and extends along separate helical paths along the circumference of the forebody.

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

**LEADING EDGE VORTEX FLAPS FOR DRAG REDUCTION Patent Application**

Dhanvada M. Rao. inventor (to NASA) (Old Dominion Univ.) Filed 26 Nov. 1980 12 p Sponsored by NASA

(NASA-Case-LAR-12750-1; US-Patent-Appl-SN-210491) Avail: NTIS HC A02/MF A01 CSCL 01A

A leading edge flap system to control the coiled vortex formation on highly swept slender wings designed for supersonic flight is disclosed. The vortex flap is positioned forward of, and at an angle downward from, the leading edge of the wings. It is retracted beneath the wings during supersonic flight. Flow separation occurs on the highly deflected vortex flap creating a coiled vortex on the vortex flap surface. The suction of the coiled vortex produces an aerodynamic thrust component. The
pitch up and lateral stability problem associated with coiled vortex
formation on the wing surface are reduced. Segmented flaps
with independent adjustment allow optimum flow conditions to
be closely approximated.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft;
air navigation systems (satellite and ground based); and
air traffic control.

For related information see also 17 Spacecraft Com-
munications, Command, and Tracking and 32 Communica-
tions.

04 AIRCRAFT COMMUNICATIONS

and Navigation

National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.

AUTONOMOUS NAVIGATION SYSTEM Patent
Shmuel J. Merhav, inventor (to NASA) (NAS-NRC, Washington,
Supersedes N79-33177 (17 - 24, p 3174); Sponsored by NASA
(NASA-Case-ARC-11257-1; US-Patent-4,244,215; US-Patent-Appl-

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

05 AIRCRAFT DESIGN, TESTING
AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also 18 Spacecraft Design,

COMPUTING LINKAGE FOR MAIN ROTOR CONTROL Patent
Philip A. E. Jeffery (United Aircraft Corp., Stratford, Conn.) and
Rudolf F. Huber, inventors (to NASA) (United Aircraft Corp.,
1979 Supersedes N79-15057 (17 - 06, p 0694); Sponsored
by NASA (NASA-Case-LAR-11797-1; US-Patent-4,245,956;
US-Patent-Class-244-17.25; US-Patent-Class-416-500;
Office CSCL 01C

A compensating linkage for the rotor control system on rotary
wing aircraft is described. The main rotor and transmission are
isolated from the airframe structure by elastic suspension. The
compensating linkage prevents unwanted signal inputs to the
control system caused by relative motion of the airframe
structure and the main rotor and transmission.

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

SKIN FRICTION MEASURING DEVICE FOR AIRCRAFT Patent
Lawrence C. Montoya and Donald R. Bellman, inventors (to NASA)
Issued 23 Dec. 1980 8 p Filed 7 Aug. 1979
Supersedes N79-31139 (17 - 22, p 2895);
(NASA-Case-FRC-11029-1; US-Patent-4,240,290; US-
Office CSCL 01D

A skin friction measuring device for measuring the resistance
of an aerodynamic surface to an airstream is described. It was
adapted to be mounted on an aircraft and is characterized by a
friction plate adapted to be disposed in a flush relationship with
the external surface of the aircraft and be displaced in response
to skin friction drag. As an airstream is caused to flow over the
A gas turbine engine control system maintains a selected level of engine performance despite the failure or abnormal operation of one or more engine parameter sensors. The control system employs a continuously updated engine model which simulates engine performance and generates signals representing real-time estimates of the engine parameter sensor signals. The estimate signals are transmitted to a control computational unit which utilizes them in lieu of the actual engine parameter sensor signals to control the operation of the engine. The estimate signals are also compared with the corresponding actual engine parameter sensor signals and the resulting difference signals are utilized to update the engine model. If a particular difference signal exceeds specific tolerance limits, the difference signal is inhibited from updating the model and a sensor failure indication is provided to the engine operator.

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

A curved centerline air intake for a gas turbine engine was disposed about a curved centerline for the purpose of accepting intake air that is flowing at an angle to engine centerline and progressively turning that intake airflow along a curved path into alignment with the engine. This curved inlet is intended for use in under the wing locations and similar regions where airflow direction is altered by aerodynamic characteristics of the airplane. By curving the inlet, aerodynamic loss and acoustic generation and emission are decreased.

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

A control system for a turbofan engine receives signals from a number of engine sensors and from the engine operator, and generates control signals. One control signal regulates the fan exhaust nozzle area in order to control inlet throat Mach number to maintain a low level of engine noise. Additional control signals regulate fuel flow to control engine thrust and fan pitch to control fan speed. A number of schedules are utilized to maintain a
predetermined relationship between the controlled parameters and a number of fixed and calculated limits can override the control signals to prevent unsatisfactory engine performance.

**N81-19130** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**THRUST AUGMENTED SPIN RECOVERY DEVICE Patent**

Yaw control surfaces were developed for a jet propelled aircraft. A thrust augmented rudder is disposed above the jet exhaust stream and a thrust rudder tab extends downward into the jet exhaust stream. These components are cooperatively deflected to generate yawing moments for directional control of the aircraft.

**N81-12156** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

**METHOD OF AND APPARATUS FOR DAMPING NUTATION MOTION WITH MINIMUM SPIN AXIS ATTITUDE DISTURBANCE Patent Application**

A method for damping nutation of a spinning spacecraft is described. The spin axis attitude disturbances were substantially reduced by controlling at least one nutation damping gas thruster to fire with nonuniform gas pulses. During the beginning of a nutation control sequence, the duration of successive gas pulses was gradually increased from zero to a predetermined maximum duration. The duration of successive pulses was then maintained constant for a time period. At the end of the nutation...
control sequence, the duration of successive gas pulses was gradually reduced to zero. NASA

24 COMPOSITE MATERIALS

Includes laminates.


PROCESS FOR PREPARING HIGH TEMPERATURE POLYIMIDE FILM LAMINATES Patent Application

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

N81-13999* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRUCTURAL WOOD PANELS WITH IMPROVED FIRE RESISTANCE Patent

Structural wood paneling or other molded wood compositions consisting of finely divided wood chips, flour, or strands are bound together and hot pressed with a modified novolac resin which is the cured product of a prepolymer made from an aralkyl ether or halide with a phenol and a hardening agent such as hexamethylene tetramine. The fire resistance of these articles is further improved by incorporating in the binder certain inorganic fillers, especially a mixture of ammonium oxalate and ammonium phosphate.

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

N81-14000* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PARTIAL INTERLAMINAR SEPARATION SYSTEM FOR COMPOSITES Patent

This inventor relates to an interlaminar separation system for composites wherein a thin layer of a perforated foil film is interposed between adjacent laminae of a composite formed from prepreg tapes to thereby permit laminate adherence through the perforations and produce a composite structure having improved physical property characteristics.

Official Gazette of the U.S. Patent and Trademark Office
ABSORBENT PRODUCT AND ARTICLES MADE THEREFROM Patent Application
James V. Correale and Frederic S. Dawn, inventors (to NASA)
Filed 24 Dec. 1980 14 p

A multilayer absorbent product is described for use in contact with the skin to absorb fluids, the product having a water pervious facing layer for contacting the skin, a first fibrous wicking layer overlaying the water pervious layer, a first container section defined by inner and outer layers of a water pervious wicking material between which is disposed a first absorbent mass, a second container section defined by inner and outer layers of a water pervious wicking material between what is disposed a second absorbent mass and a liquid impermeable/gas permeable layer overlaying the second fibrous wicking layer.

METHOD FOR ALLEVIATING THERMAL STRESS DAMAGE IN LAMINATES Patent
Charles A. Hoffman, John W. Weston, and Norman W. Orth, inventors (to NASA)

A method is provided for alleviating the stress damage in metallic matrix composites, such as laminated sheet or foil composites. Discontinuities are positively introduced into the interface between the layers so as to reduce the thermal stress produced by unequal expansion of the materials making up the composite. Although a number of discrete elements could be used to form one of the layers and thus carry out this purpose, the discontinuities are preferably produced by simply drilling holes in the metallic matrix layer or by forming grooves in a grid pattern in this layer.
25 INORGANIC AND PHYSICAL CHEMISTRY

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

For related information see also 77 Thermodynamics and Statistical Physics.

N81-14015* National Aeronautics and Space Administration. Pasadena Office, Calif.

STARK CELL OPTOACOUSTIC DETECTION OF CONSTITUENT GASES IN SAMPLE Patent

An optoacoustic detector for gas analysis is implemented with Stark effect cell modulation for switching a beam in and out of coincidence with a spectral line of a constituent gas in order to eliminate the heating effect of laser energy in the cell as a source of background noise. By using a multiline laser, and linearly sweeping the dc bias voltage while exciting the cell with a multiline laser, it is possible to obtain a spectrum from which to determine the combinations of excited constituents and determine their concentrations in parts per million.

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

N81-14016* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PERFLUOROALKYL POLYTRIAZINES CONTAINING PENDENT IODODIFLUOROMETHYL GROUPS Patent

New perfluoralkyl polytriazines containing pendent iododifluoromethyl groups are prepared by the reaction of perfluoralkyl dinitriles with ammonia to form polyimidoylamidines, followed by the cyclization of the imidoylamidine groups with, e.g., various mixtures of a perfluorocarboxylic fluoride and an omega iodoperfluoroacyl fluoride. The polytriazines obtained can be cured by heat which causes crosslinking at the iododifluoromethyl groups by elimination of iodine and formation of carbon-to-carbon bonds.

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

N81-16174* National Aeronautics and Space Administration. Pasadena Office, Calif.

A METHOD FOR PRODUCING A SOLIDIFIED BODY OF SILICON Patent Application

A method is disclosed for producing solidified bodies from fluid material such as producing a polycrystalline body of silicon from submicron silicon powder, as well as various silicon compounds. A pedestal of a generally cylindrical configuration is supported for rotation beneath a heating unit for purposes of establishing a layer of molten material into which is deposited a stream of submicron silicon powder from a tube. The material of the layer is incrementally frozen as the pedestal is lowered. A more usable form of silicon is provided for use in the solar cell industry.

NASA

N81-17187* National Aeronautics and Space Administration. Pasadena Office, Calif.

INSOLUBLE POLYELECTROLYTE AND ION-EXCHANGE HOLLOW FIBER IMPREGNATED THEREWITH Patent

New perfluoralkyl polytriazines containing pendent iododifluoromethyl groups are prepared by the reaction of perfluoralkyl dinitriles with ammonia to form polyimidoylamidines, followed by the cyclization of the imidoylamidine groups with, e.g., various mixtures of a perfluorocarboxylic fluoride and an omega iodoperfluoroacyl fluoride. The polytriazines obtained can be cured by heat which causes crosslinking at the iododifluoromethyl groups by elimination of iodine and formation of carbon-to-carbon bonds.

Official Gazette of the U.S. Patent and Trademark Office
The number of quaternary sites and ion exchange capacity of a polyquaternary, cross linked, insoluble copolymer of a vinyl pyridine and a dihalo organic compound is increased by about 15-36% by reaction of the polymer with an amine followed by quaternization, if required. The polymer forms spontaneously in the presence of a substrate such as within the pores of a hollow fiber. The improved resin impregnated fiber may be utilized to remove ions from waste or process streams.

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

N81-19244* National Aeronautics and Space Administration. Pasadena Office, Calif.
ION-EXCHANGE HOLLOW FIBERS
Alan Rembaum (JPL). Shiao-Ping S. Yen (JPL), and Elias Klein, inventors (to NASA) 16 Mar. 1976 10 p Filed 23 May 1973

An ion-exchange hollow fiber is prepared by introducing into the wall of the fiber polymerizable liquid monomers, and polymerizing the monomers therein to form solid, insoluble, crosslinked, ion-exchange resin particles which embed in the wall of the fiber. Excess particles blocking the central passage or bore of the fiber are removed by forcing liquid through the fiber. The fibers have high ion-exchange capacity, a practical wall permeability and good mechanical strength even with very thin wall dimensions. Experimental investigation of bundles of ion-exchange hollow fibers attached to a header assembly have shown the fiber to be very efficient in removing counterions from solution.

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

N81-19245# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HEAT PIPES TO REDUCE ENGINE EXHAUST EMISSIONS Patent Application

A fuel combustor employing heat transfer devices for improving combustion efficiency and reducing engine exhaust emissions is described. The fuel combustor consists of a fuel combustor employing heat transfer devices for improving combustion efficiency and reducing engine exhaust emissions is described. The fuel combustor consists of an elongated casing with an air inlet conduit portion at one end. An elongated heat pipe is mounted longitudinally in the casing and is offset from and extends alongside an intermediate combustion space. The heat pipe is in heating transmitting relationship with the air intake conduit for heating incoming air. A fuel conduit has a portion engaged in heat transfer relationship of the heat pipe for preheating the fuel. The offset position of the heat pipe relative to the combustion space minimizes the quenching effect of the heat pipe on the gaseous products of combustion, as well as reducing coking of the fuel on the heat pipe, thereby improving the efficiency of the combustor.

NASA

PROCESS FOR PREPARATION OF LARGE-PARTICLE-SIZE MONODISPERSE LATEXES Patent

Monodisperse latexes having a particle size in the range of 2 to 40 microns are prepared by seeded emulsion polymerization in microgravity. A reaction mixture containing smaller monodisperse latex seed particles, predetermined amounts of monomer, emulsifier, initiator, inhibitor and water is placed in a microgravity environment, and polymerization is initiated by heating. The reaction is allowed to continue until the seed particles grow to a predetermined size, and the resulting enlarged particles are then recovered. A plurality of particle-growing steps can be used to reach larger sizes within the stated range, with enlarged particles from the previous steps being used as seed particles for the succeeding steps. Microgravity enables preparation of particles in the stated size range by avoiding gravity related problems of creaming and settling, and flocculation induced by mechanical shear that have precluded their preparation in a normal gravity environment.

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

Official Gazette of the U.S. Patent and Trademark Office
26 METALLIC MATERIALS
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N81-12211* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
NiCrAI TERNARY ALLOY HAVING IMPROVED CYCLIC OXIDATION RESISTANCE Patent Application
C. A. Barrett, inventor (to NASA) Filed 23 Oct. 1980 6 p
NiCrAl alloys were improved by the addition of zirconium. These alloys are in the beta or gamma/gamma prime + beta region of the ternary system. Zirconium was added in a very low amount between 0.06 and 0.20 weight percent. There was a narrow optimum zirconium level at the low value of 0.13 weight percent. Maximum resistance to cyclic oxidation was achieved when the zirconium addition was at the optimum value. NASA

N81-18209* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
IMPROVED REFRACTORY COATINGS Patent Application
William A. Brainard, inventor (to NASA) Filed 29 Sep. 1980 8 p
(NASA-Case-LEW-23169-2; US-Patent-App1-SN-191746) Avail: NTIS HC A02/MF A01 CSCL 11F
The adhesion, friction and wear properties of sputtered refractory coatings on substrates of materials that form stable nitrides are enhanced by placing each substrate directly below a titanium carbide target of a commercial radiofrequency diode apparatus in a vacuum chamber. Nitrogen is bled into the system through a nozzle resulting in a small partial pressure of about 0.5% to 2.5% during the first two minutes of deposition. The flow of nitrogen is then stopped, and the sputtering ambient is reduced to pure argon through a nozzle without interrupting the sputtering process. When nitrogen is deliberately introduced during the crucial interface formation, some of the titanium at the interface reacts to form titanium nitride while the metal of the substrate also forms the nitride. These two nitrides atomically mixed together in the interfacial region act to more strongly bond the growing titanium carbide coating as it forms on the substrate. NASA

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

N81-14076* National Aeronautics and Space Administration.
Pasadena Office, Calif.
MEMBRANE CONSISTING OF POLYQUATERNARY AMINE ION EXCHANGE POLYMER NETWORK INTERPERETRATING THE CHAINS OF THERMOPLASTIC MATRIX POLYMER Patent
An ion exchange membrane was formed from a solution containing dissolved matrix polymer and a set of monomers which are capable of reacting to form a polyquaternary ion exchange material; for example vinyl pyridine and a dihalo hydrocarbon. After casting solution and evaporation of the volatile component's, a relatively strong ion exchange membrane was obtained which form is capable of removing anions, such as nitrate or chromate from water. The ion exchange polymer forms an interpenetrating network with the chains of the matrix polymer.

N81-14077* National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
SURFACE FINISHING Patent
A surface of an article adapted for relative motion with a fluid environment is finished by coating the surface with a fluid adhesive, covering the adhesive with a sheet of flexible film material under tension on the film material whereby the tensioned film material is bonded to the surface by the adhesive.

Official Gazette of the U.S. Patent and Trademark Office
plasticizers. The assembly is then heated in a mold under pressure. The sheet material is made up by dissolving a portion of the plasticized elastomer in an organic solvent, casting the solution, exposing it to a vacuum to remove the solvent and plasticizers, dissolving the deplasticized material in liquid adhesive and casting and drying the resulting liquid.

**N81-15104**
National Aeronautics and Space Administration.
Pasadena Office, Calif.
**VISCOELASTIC CATIONIC POLYMERS CONTAINING THE URETHANE LINKAGE** Patent
Alan Rembaum, inventor (to NASA) JPL, California Inst. of Technology, Pasadena) issued 14 Apr. 1972 9 p Filed 19 May 1969
A method for the synthesis and manufacturing of elastomeric compositions and articles containing quaternary nitrogen centers and condensation residues along the polymeric backbone of the centers is presented. Linear and cross-linked straight chain and block polymers having a wide damping temperature range were synthesized. Formulae for the viscoelastic cationic polymers are presented. T.M.

**N81-15107**
National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
**THERMOSET-THERMOPLASTIC AROMATIC POLYAMIDES Patent Application**
Ter L. St.Claire, James F. Wolfe (Virginia Polytechnic Inst. and State Univ.), and Thomas D. Greenwood, inventors (to NASA) (King Coll.) Filed 23 Oct. 1980 11 p
(NASA-Case-LAR-12723-1; US-Patent-Appl-SN-199768) Avail:
NTIS HC A02/MF A01 CSCL 07C
A composition and method 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 are described. NASA

**N81-16238**
National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
**METHOD OF BONDING PLASTICIZED ELASTOMER TO METAL AND ARTICLE PRODUCED THEREBY Patent Application**
William T. White, Johnny M. Clemens, and Frank E. Ledbetter, inventors (to NASA) Filed 19 Dec. 1980 9 p
(NASA-Case-MFS-25181-1; US-Patent-Appl-SN-21a585) Avail:
NTIS HC A02/MF A01 CSCL 11A
A plasticized elastomer is securely bonded to a metal surface by interposing between the adhesive coated metal surface and the elastomer a sheet of material obtained by combining adhesive, with a portion of the elastomer that has been treated to remove... NASA
hydrocarbon oil suitable for use as a synthetic liquid fuel.

28 PROPELLANTS AND FUELS

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

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

N81-14103* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

ATOMIC HYDROGEN STORAGE METHOD AND APPARATUS Patent

Atomic hydrogen, for use as a fuel or as an explosive, is stored in the presence of a strong magnetic field in exfoliated layered compounds such as molybdenum disulfide or an elemental layer material such as graphite. The compounds maintained at liquid helium temperatures and the atomic hydrogen is collected on the surfaces of the layered compound which are exposed during delamination (exfoliation). The strong magnetic field and the low temperature combine to prevent the atoms of hydrogen from recombining to form molecules.

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

N81-15119* National Aeronautics and Space Administration.
Pasadena Office, Calif.

RECOVERY OF ALUMINUM FROM COMPOSITE PROPELLANTS Patent

Aluminum was recovered from solid rocket propellant containing a small amount of oxidizer by depolymerizing and dissolving propellant binders (containing functional or hydrolyzable groups in a solution of sodium methoxide) in an alcohol solvent optionally containing an aliphatic or aromatic hydrocarbon co-solvent. The solution was filtered to recover substantially all the aluminum in active form.

Official Gazette of the U.S. Patent and Trademark Office
31 ENGINEERING (GENERAL)

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


BEAM CONNECTOR APPARATUS AND ASSEMBLY Patent Application
Georg von Tiesenhausen, inventor (to NASA) Filed 8 Oct. 1980
13 p

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

N81-15154 National Aeronautics and Space Administration. Pasadena Office, Calif.

CONTINUOUS COAL PROCESSING METHOD Patent

A coal pump is provided in which solid coal is heated in the barrel of an extruder under pressure to a temperature at which the coal assumes plastic properties. The coal is continuously extruded, without static zones, using, for example, screw extrusion preferably without venting through a reduced diameter die to form a dispersed spray. As a result, the dispersed coal may be continuously injected into vessels or combustors at any pressure up to the maximum pressure developed in the extrusion device. The coal may be premixed with other materials such as desulfurization aids or reducible metal ores so that reactions occur, during or after conversion to its plastic state. Alternatively, the coal may be processed and caused to react after extrusion, through the die, with, for example, liquid oxidizers, whereby a coal reactor is provided.

N81-14137 National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

FIRE EXTINGUISHING APPARATUS HAVING A SLIDABLE MASS FOR A PENETRATOR NOZZLE Patent

A fire extinguishing apparatus for delivering an extinguishing agent through a tunnel surrounding a structure into its interior includes an elongated tunnel nozzle body which has a pointed penetrating head carried on one end of the tunnel body. A source of extinguishing agent coupled to the opposite end of the tunnel body is fed through and passes through passages adjacent the head for delivering the extinguishing agent to the interior of the structure. A slidable mass is carried on the tunnel body on a remote end of the tunnel body from the penetrating head. By manipulating the slidable mass and bringing such in contact with an abutment the force imparted to the tunnel body causes the head to penetrate the structure.

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

N81-16327 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

TEXTURING POLYMER SURFACES BY TRANSFER CASTING Patent Application
Bruce A. Banks, Albert J. Weigand, and James S. Sovey, inventors (to NASA) Filed 19 Dec. 1980 7 p

A surface of a fluorocarbon polymer is exposed to a beam of ions from a source to texture it. The polymer which is to be surface roughened is then cast over the textured surface of the fluorocarbon polymer. After curing, the cast polymer is peeled off the textured fluorocarbon polymer and the peeled off surface
has a negative replica of the textured surface. The microscopic surface texture provides large surface areas for adhesive bonding. In cardiovascular prosthesis applications the surfaces are relied on for the development of a thin adherent well nourished thrombus.

METHOD OF FORMING FROZEN SPHERES IN A FORCE-FREE DROP TOWER Patent Application
James M. Kendall, Jr., inventor (to NASA) (JPL) Filed 24 Dec. 1980 11 p
(Contract NAS7-100)

A technique is disclosed for uniformly shaping hollow glass spheres by the effects of surface tension acting on bubbles of glass in its molten state. The metal surfaces of the structures that are to be bonded are exposed to an ion beam together with a target of low sputtering yield material. This material deposits on the surfaces and creates sites of sputter resistance which evolve into peaks of a conulike surface microstructure. The textured metal surfaces are arranged in face-to-face relationship and compressed together with plastic deformation which mechanically interlocks the cone. A large interface area is produced which minimizes thermal and electrical losses. Also, no electrical power or heat is required during metal joining. The process can be performed in either air or vacuum.

SAFETY SHIELD FOR VACUUM/PRESSURE CHAMBER VIEWING PORT Patent

Observers are protected from flying debris resulting from a failure of a vacuum or pressure chamber viewing port following an implosion or explosion by an optically clear shatter resistant safety shield which spaced apart from the viewing port on the outer surface of the chamber.

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

MECHANICAL BONDING OF METAL Patent Application
Bruce A. Banks, inventor (to NASA) Filed 26 Nov. 1980 8 p

The metal surfaces of the structures that are to be bonded are exposed to an ion beam together with a target of low sputtering yield material. This material deposits on the surfaces and creates sites of sputter resistance which evolve into peaks of a conulike surface microstructure. The textured metal surfaces are arranged in face-to-face relationship and compressed together with plastic deformation which mechanically interlocks the cone. A large interface area is produced which minimizes thermal and electrical losses. Also, no electrical power or heat is required during metal joining. The process can be performed in either air or vacuum.

A CYCLING JOULE THOMSON REFRIGERATOR Patent Application
Emanuel Tward, inventor (to NASA) (JPL) Filed 28 Jan. 1981 18 p
(Contract NAS7-100)
A symmetrical adsorption pump/compressor system having a pair of mirror image legs and a Joule-Thomson expander, or valve, interposed between the legs thereof for providing a new, efficient refrigeration cycle is described. The system further includes a plurality of gas operational heat switches adapted selectively to transfer thereto heat from a thermal load and to transfer or discharge heat therefrom through a heat projector, such as a radiator or the like. The heat switches comprise gas pressurizable chambers adapted for alternate pressurization in response to adsorption and desorption of a pressurizing gas confined therein.

A method and apparatus are disclosed for distributing a stable reference frequency from a hydrogen maser frequency standard, or similar RF source, to remote stations over great distances with very good phase stability, and with constant amplitude, at each distribution point using a light beam carrier. A technique for providing automatic gain control at an optical receiver with phase stability in the RF reference is provided.
circularly polarized electromagnetic radiation. Combined operation of the two antenna cavities with a 180 deg phase differential between the fields related to the two antenna cavities provides a broad beam, relatively wide frequency bandwidth communication capability. Particular embodiments disclosed feature a generally square cavity array as well as a circular cavity array.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

PHASE MODULATION OF RECEPTION

A delay-locked loop is presented for tracking a pseudonoise (PN) reference code in an incoming communication signal. The loop is less sensitive to gain imbalances, which can otherwise introduce timing errors in the PN reference code formed by the loop. For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

THREE PHASE POWER FACTOR CONTROLLER

A power control circuit for a three phase induction motor is described. The power factors for the three phases are summed to provide a control signal. This control signal is particularly filtered and then employed to control the duty cycle of each phase of input power to the motor.

N81-15179* National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
PSEUDONOISE CODE TRACKING LOOP Patent
A delay-locked loop is presented for tracking a pseudonoise (PN) reference code in an incoming communication signal. The loop is less sensitive to gain imbalances, which can otherwise introduce timing errors in the PN reference code formed by the loop. Official Gazette of the U.S. Patent and Trademark Office

N81-12330* National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
RECEIVING AND TRACKING PHASE MODULATED SIGNALS Patent Application
An apparatus and technique are described for receiving and tracking analog or digital phase modulated signals from 0 deg to 360 deg phase shift. In order to track a signal with many

N81-16338* National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
RECEIVING AND TRACKING PHASE MODULATED SIGNALS Patent Application
An apparatus and technique are described for receiving and tracking analog or digital phase modulated signals from 0 deg to 360 deg phase shift. In order to track a signal with many
NON-CONTACTING POWER TRANSFER DEVICE Patent Application


A transformer for coupling AC electrical energy from a stationary element to a rotating element without the use of sliding contacts is described. The transformer is of the rotary type and includes a ferrite core and two primary windings which are stationary with respect to a secondary winding which rotates within an annular cavity adjacent to an axial bore in the core. The core is comprised of two cup type core halves. Electrical connection to the secondary winding is made through a split bobbin assembly which couples to a coaxial shaft assembly located in the axial bore. The electrical coupling to the coaxial shaft assembly is made through a continuous transverse channel connecting the axial bore with the annular cavity. NASA

BASE DRIVE FOR PARALLELED INVERTER SYSTEMS Patent


In a paralleled inverter system, a positive feedback current derived from the total current from all of the modules of the inverter system is applied to the base drive of each of the power transistors of all modules, thereby to provide all modules protection against open or short circuit faults occurring in any of the modules, and force equal current sharing among the modules during turn on of the power transistors.

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

METHOD AND APPARATUS FOR QUADRIPHASE-SHIFT-KEY AND LINEAR PHASE MODULATION Patent


A submultiphase of an S-band transmitter output frequency was divided equally between a linear phase modulation branch and a QPSK modulation branch. The linear modulation branch includes a multiplier to increase the carrier frequency to a level which, when combined with the carrier in the QPSK branch in an up-converter (utilizing a mixer at the input followed by a bandpass filter), produces the transmitter output frequency. This allows the QPSK modulator to operate at one-eighth of the output frequency where repeatable and precisely controlled modulation can be easily achieved. This also allows linear phase modulation at one-eighth the output frequency where low...
modulator deviation and good linearity can be easily maintained. Official Gazette of the U.S. Patent and Trademark Office

A beam splitter is located between a Fourier transform filter and an azimuth telescope for reflecting a portion of a modulated laser beam to a plane containing two photodiodes. The photodiodes are positioned with respect to the reflected laser beam's Gaussian distribution so that they each experience the same light intensity in the absence of a Doppler shift. As Doppler shifts occur, the Gaussian distribution shifts either in one direction or the other, thereby creating unequal light intensities and thus currents in the photodiodes. These unequal intensities are utilized to control the angle that the laser beam intersects the signal film, the angle being adjusted until each photodiode experiences the same light intensity, thereby indicating the absence of a Doppler shift.

The RF output of a voltage controlled oscillator (VCO) is periodically gated by a gate to a transducer which produces acoustic waves in a bolt. The reflected acoustic waves are converted to electrical signals by a transducer and gated by a gate to a mixer. The mixer also receives the output from the VCO and produces an output which is filtered by a low pass filter. The output of the filter is a dc signal proportional to the phase difference change from a fixed phase difference between the two input signals to the mixer. This dc signal is sampled at an instant and held by a circuit in response to the P signal. The output of the circuit is integrated by an integrator and then applied to the VCO to change the frequency of the VCO such that the phase difference between the two inputs to the mixer remains at said fixed phase difference. The frequency of the VCO is a measure of the change in strain of the bolt.
AN IMPROVED SOLID ELECTROLYTE CELL Patent Application
Robert Richter, inventor (to NASA) (JPL) Filed 24 Dec. 1980
(Contract NAS7-100) (NASA-Case-NPO-15269-1; US-Patent-Appl-SN-220214) Avail: NTIS HC A02/MF A01 CSCL 09A
A solid electrolyte cell is disclosed which includes a body of solid gas-conductive electrolytes having mutually spaced surfaces on which a number of mutually spaced electrodes are deposited. Strips of bare substrate are interposed between the electrodes so that currents of ionic gas may be established between the electrodes. Electrical resistance for the cells is lowered and the gas conductivity is enhanced. NASA

A microwave integrated circuit comprised of one or more Josephson junctions and short sections of microstrip or stripline transmission line is fabricated from thin layers of superconducting metal on a dielectric substrate. The short sections of transmission are combined to form the elements of the circuit and particularly, two microwave resonators. The Josephson junctions are located between the resonators and the impedance of the Josephson junctions forms part of the circuitry that couples the two resonators. The microwave integrated circuit has an application in Josephson voltage standards. In this application, the device is asymmetrically driven at a selected frequency (approximately equal to the resonance frequency of the resonators), and a d.c. bias is applied to the junction. By observing the current voltage characteristic of the junction, a precise voltage, proportional to the frequency of the microwave drive signal, is obtained. Official Gazette of the U.S. Patent and Trademark Office

TACTILE SENSING SYSTEM Patent Application
A tactile sensing system comprises a sheet of flexible material on top of a semiconductor layer on which an array of electrodes is formed. Computing elements are present in the layer and are connected via lines to the electrodes, to each other and to an external sequence controller and a manipulator collector. The electrodes, the computing elements and the interconnecting lines are formed by large scale integration, thereby resulting in a relatively small sensor with a dense array of electrodes convertible to the external circuitry by a minimum number of wires. NASA

DIGITAL NUMERICALLY CONTROLLED OSCILLATOR Patent
The frequency and phase of an output signal from an oscillator circuit are controlled with accuracy by a digital input word. Positive and negative alterations in output frequency are both provided for by translating all values of input words so that they are positive. The oscillator reference frequency is corrected only in one direction, by adding phase to the output frequency of the oscillator. The input control word is translated to a single algebraic sign and the digital 1 is added thereto. The translated input control word is then accumulated. A reference clock signal having a frequency at an integer multiple of the desired frequency of the output signal is generated. The accumulated control word is
A susceptor for facilitating induction heating of silicon melt is described. The susceptor comprises a pair of susceptor halves of a thickness less than two skin depths, each being the mirror image of the other, disposed in mutually opposed, electrically insulated relation. The crucible comprises a quartz body supported by the graphite susceptor, whereby the R-F coil is electrically coupled with the melt.

A susceptor for facilitating Induction heating of silicon melt is described. The susceptor comprises a pair of susceptor halves of a thickness less than two skin depths, each being the mirror image of the other, disposed in mutually opposed, electrically insulated relation. The crucible comprises a quartz body supported by the graphite susceptor, whereby the R-F coil is electrically coupled with the melt.

A voltage regulated DC to DC converter uses an inductor and a capacitor as storage elements. The inductor is composed of two windings having a common junction. A transformer with a center tap connected to the common junction of the two windings is connected at either end of its winding to ground through controlled switches. One winding of the inductor and either end of the transformer winding are connected by power diodes to the capacitor which supplies the output voltage to a load. The other winding of the inductor is connected to a fourth power diode as a clamping diode. Input voltage is supplied to the inductor through a third controlled switch. A pulse width modulator connected to the output of the converter alternately closes and opens the switches connected to either end of the transformer winding and also closes the switch supplying input voltage to the inductor each time either of the switches connected to the ends of the transformer winding are closed. The duty cycle of the closing and opening of the several switches is adjusted by the pulse modulator to regulate the output voltage.

Current spikes in a buck power converter due to commutating diode turn-off time are eliminated by using a tapped inductor in the converter with the tap connected to the switching transistor. The commutating diode is not in the usual place, but is instead connected to conduct current from one end of the tapped inductor remote from the load during the interval in which the transistor is not conducting. In the case of a converter having a center-tapped (primary and secondary) transformer between two switching power transistors operated in a push-pull mode and two rectifying diodes in the secondary circuit, current spikes due to transformer saturation are also eliminated by using a tapped inductor in the converter with the tap connected to the rectifying diodes and a diode connected to conduct current from one end of the tapped inductor remote from the load during the interval in which the transistors are not conducting.
A structural array and electrical rotary joint for transmitting an electrical power between large space structures having relative rotational movement therebetween is disclosed as including large support framework structures which rotate relative to one another about a common axis of rotation. The arrangement of cylindrical hub members and associated support structure in combination with the electrical conductor and bearings enable transmission of large amounts of electrical power from structures such as a solar array to a microwave antenna while maintaining a high degree of dimensional stability.
mixing of the cooling fluid with the hot gas, thereby substantially increasing the length of the film in a downstream direction.

35 INSTRUMENTATION AND PHOTOGRAPHY

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

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

N81-12386*| National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERFEROMETRIC ANGLE MONITOR Patent Application

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

N81-12388*| National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MINIATURE SPECTRALLY SELECTIVE DOSIMETER Patent Application

A miniature spectrally selective dosimeter capable of measuring selected bandwidths of radiation exposure on small mobile areas is proposed. The dosimeter is a combination of photovoltaic detectors, electrochemical integrators (E-cells) and filters in a compact case which is easily attached close to and substantially parallel to the surface being measured. In one embodiment two photovoltaic detectors, two E-cells and three filters are packaged in a small case with attaching means consisting of a clip to clip over a side piece of an eye glass frame. In a further embodiment, the electro-optic elements are packaged in a wristwatch case with attaching means being a watchband. The filters in all embodiments allow only selected wavelengths of radiation to be detected by the photovoltaic detectors and then integrated by the E-cells.

N81-12387*| National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MULTIPRISM COLLIMATOR Patent Application

A special purpose optical collimator system which generates multiple collimated light beams, with precisely related angular separation of the beams is described. The system is comprised of a stack of relatively flat plate like refracted prisms in the form of wedges, each having a specified angular deviation, mounted on top of one another in a fixture which holds the wedges so that they are adapted to operate at minimum angular deviation and thus are relatively insensitive to rotational and angular changes. A collimated source of monochromatic light generated, for example, by a helium neon laser and a collimated beam expander provides a common incident beam to the wedges whereupon a plurality of, for example, equally spaced emergent beams are provided.

N81-12389*| National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PYROELECTRIC DETECTOR ARRAYS Patent Application

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

An improved hot wire transducer skin friction sensor is described. The device utilizes foil transducers with only one edge exposed to the fluid flow. The surfaces are polished producing a foil transducer that does not generate turbulence while sufficiently thick to carry the required electrical current for high temperature fluid flow. The assembly utilized a precut layered metal sandwich with attached electrodes eliminating a need for welding and individual sensor calibration. NASA

A cryostat for use in a low or a substantially gravity-free environment adapted to cool an experiment through the use of helium 2, or helium in its super fluid state is characterized by a number of interchangeable daughter dewars and helium supply or mother dewar. A low pressure venting system is provided for converting helium contained in the mother dewar to a superfluid state for use as a primary cryogen. Each daughter dewar is adapted to be removable mounted in mated relation on the mother dewar and is characterized by support for an experiment package, a source of helium to be employed as a secondary cryogen. A heat pipe is suspended from each daughter dewar and adapted to be extended into the mother dewar for facilitating cooling of the secondary cryogen. A transfer of heat from the package to the primary cryogen, via the secondary cryogen, is accommodated as a film flow of helium 2 progresses from the heat pipe to the experiment dewar.

A specimen in a closed environment is suspended in a levitating field, melted, and then cooled and solidified by the injection of a quench gas. The apparatus disclosed employs an electromagnetic levitation system and housing which is evacuated by a vacuum pump or supplied with a controlled amount of argon gas from a source through a valve. The levitation system has a coil made of copper tubing and is connected to an induction generator. A supply of quench gas is connected to the housing by a line and valve. After a levitated specimen is melted, quenching gas of high thermal conductivity is rapidly introduced. This raises the pressure from 40 to 400 Torr, which quickly cools and solidifies the specimen.

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35 INSTRUMENTATION AND PHOTOGRAPHY

CONTAINERLESS HIGH TEMPERATURE CALORIMETER APPARATUS Patents
A calorimeter apparatus for measuring high temperature thermophysical properties of materials is disclosed which includes a containerless heating apparatus in which the specimen is suspended and heated by electron bombardment.

N81-19429* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SELF-CALIBRATING THRESHOLD DETECTOR Patent
A self calibrating threshold detector comprises a single demodulating channel which includes a mixer having one input receiving the incoming signal and another input receiving a local replica code. During a short time interval, an incorrect local code is applied to the mixer to incorrectly demodulate the incoming signal and to provide a reference level that calibrates the noise propagating through the channel. A sample and hold circuit is coupled to the channel for storing a sample of the reference level. During a relatively long time interval, the correct replica code provides an output level which ranges between the reference level and a maximum level that represents incoming signal presence and synchronism with the replica code. A summer subtracts the stored sample reference from the output level to provide a resultant difference signal indicative of the acquisition of the expected signal.

N81-19430* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FIXTURE FOR ENVIRONMENTAL EXPOSURE OF STRUCTURAL MATERIALS UNDER COMPRESSION Patent Application
A device for stressing a deformable materials specimen consists of a top plate and a bottom plate sandwiching a guide cylinder. The specimen is positioned on the bottom plate and attached to a load piston. Force is applied through the top plate into the guide cylinder. The specimen is then loaded, the stress is maintained by tightening tie bolt nuts.

N81-19431* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTRUSION DETECTION METHOD AND APPARATUS Patent Application
A system for monitoring unwanted subterranean entries and departures from a secure and for locating and intrusion includes an array of seismic sensors arranged along a perimeter to be monitored. Two wires lead from each sensor to a central monitoring station which has three modes of operation. In the...
first mode, the output of all the seismic sensors is summed into a receiver for amplification and detection. In the second mode, the individual output signals from the sensors are multiplexed into the receiver via scanner and gates for sequentially interrogating each of the sensors. The third operating mode permits the operator to manually scan up and down the individual sensors. In this manner a more precise location of the intrusion is obtained. An automatic gain control is provided for the receiver allowing the sensitivity of the receiver to be automatically adjusted for optimum sensitivity with changes in background noise level.

36 LASERS AND MASERS

Includes parametric amplifiers.

N81-12407*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OFF-AXIS COHERENTLY PUMPED LASER Patent Application

A coherently optically pumped laser system is described. A pump laser beam propagates through a laser medium contained in a degenerate cavity resonator in a controlled multiple round trip fashion in such a way that the unused pump beam emerges from an injection aperture at a different angle from which it enters the resonator. The pump beam is angularly injected off the central axis of the resonator body whereupon the pump beam alternately undergoes spreading and focusing while pumping the laser medium by a process of resonant absorption. The emergent pump beam can also be used as a second pump beam source by being reinjected back into the cavity or it can be used for pumping another laser.

N81-15350*# National Aeronautics and Space Administration. Pasadena Office, Calif.
SIDELOOKING LASER ALTIMETER FOR A FLIGHT SIMULATOR Patent Application

A laser altimeter for a flight simulator which allows measurement of the height of the simulator probe above the terrain directly below the probe tip is disclosed. A laser beam is directed from the probe at an angle to the horizontal to produce a beam spot on the terrain. The angle that the laser beam makes with the horizontal is varied so as to bring the beam spot into coincidence with a plumb line coaxial with the longitudinal axis of the probe. A television altimeter camera observes the beam spot and has a raster line aligned with the plumb line. Spot detector circuit coupled to the output of the TV camera monitors the position of the beam spot relative to the plumb line. An error signal is produced by computer driving, via a servo motor, the laser beam optics so as to cause the beam spot coincidence with the plumb line. At coincidence, computer looks up in a table the altitude of the probe for the given angle and reads out the altitude to an altimeter readout.

N81-19439*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DUAL LASER OPTICAL SYSTEM AND METHOD FOR STUDYING FLUID FLOW Patent Application
A dual laser optical system and method is disclosed for visualization of phenomena in transparent substances which induce refractive index gradients such as fluid flow and pressure and temperature gradients in fluids and gases. Two images representing mutually perpendicular components of refractive index gradients are viewed simultaneously on screen. Two lasers having wave lengths in the visible range but separated by about 1000 angstroms are utilized to provide beams which are collimated into a beam containing components of the different wave lengths. The collimated beam is passed through a test volume of the transparent substance. The collimated beam is then separated into components of the different wave lengths and focused on to a pair of knife edges arranged mutually perpendicular to produce and project images onto screen.

A spiral wound retaining ring 10 with angled ends 214 and 216 is described. The ring is crimped 220 at the same angle as the ring ends to maintain a constant thickness dimension. The angling of the ends of the ring and crimp allow the ends to be positioned closer together while maintaining enough clearance to enable insertion and removal of the ring. By reducing the separation distance between the ends a stronger ring results since the double layer area of the ring is maximized.
A device is disclosed, carried by a first vehicle such as an orbiting space shuttle, having a plurality of contact members for engaging and holding an annular ring on a second vehicle such as an orbiting payload. The contact members are connected to manipulator arms which are mounted at a fulcrum point and which are moved by an iris type mechanism. Movement of the manipulator arms causes the contact members to grasp or release the annular ring. Bumper devices are provided to axially align the annular ring and draw the contact members into engagement therewith.

Official Gazette of the U.S. Patent and Trademark Office
SPEED CONTROL DEVICE FOR A HEAVY DUTY SHAFT Patent

A speed control device is characterized by a reference speed shaft spatially related to a heavy duty shaft, a drive train for driving the reference speed shaft at a constant angular velocity, a drive train for driving the heavy duty shaft at a variable angular velocity and a speed control assembly for continuously comparing the angular velocity of the heavy duty shaft with the angular velocity of the reference speed shaft. A brake assembly is connected to the heavy duty shaft and is adapted to respond to errors in the angular velocity of the heavy duty shaft in order to reduce the angular velocity of the heavy duty shaft to that of the reference speed shaft.

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

N81-16468* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A METHOD AND TECHNIQUE FOR INSTALLING LIGHTWEIGHT FRAGILE, HIGH-TEMPERATURE FIBER INSULATION Patent Application

Light weight insulation batting such as alumina/zirconia or preferably saffil high temperature insulation such as alumina fiber is precut into oversize elongated solution and compressed in a mold to the required thickness or cross sectional dimensions. The saturated batting is then dried in the mold and the resin cured at an appropriate temperature. The resulting rigidized batting may then be machined to the particular required shape and dimensions for installation in wiremesh sleeving or any cavity requiring heat barrier sealing. The entire assembly is subsequently heated to a temperature much greater than the resin curing temperature to effect a clean burn-off of the resin material leaving the original mineral batting material to expand into the interior shape of the containing cavity or wiremesh sleev ing if such insulation is to be used as a heat seal around an openable door or hatch in a recoverable space vehicle.
A hand held guide for manually positioning a workpiece between the anvil rib and tool of a hot die stamping press is described. A groove completed by interchangeable cover plates attached at one end of the guide conforms to a cross sectional dimension common to similar workpieces and, with a force fit, retentively holds each of the workpieces.

PHASE-ANGLE CONTROLLER FOR STIRLING ENGINES Patent

An actuator includes a restraint link adapted to be connected with a pivotal carrier arm for a force transfer gear interposed between the crankshaft for an expander portion of a Stirling engine and a crankshaft for the displacer portion of the engine. The restraint link is releasably trapped hydraulic fluid for selectively establishing a phase angle relationship between the crankshaft. A second embodiment incorporates a hydraulic coupler for use in varying the phase angle of gear-coupled crank for a Stirling engine whereby phase angle changes are obtainable.

PRESSURE CONTROL VALVE Patent

A method for cold welding metal joints is described. In order to remove the contamination layer on the surface of the metal, an ion beam generator is used in a vacuum environment. A gas, such as xenon or argon, is ionized and accelerated toward the metal surface. The beam of gas effectively sputters away the surface oxides and contamination layer so that clean underlying metal is exposed in the area to be welded. The use of this method allows cold welding with minimal deformation. Both similar and dissimilar metals can be cold welded with this method.

METHOD OF COLD WELDING USING ION BEAM TECHNOLOGY Patent

A control valve is provided which is adapted to be connected between a pressure source, such as a vacuum pump, and a pressure vessel so as to control the pressure in the vessel. The valve comprises a housing having a longitudinal bore which is connected between the pump and vessel, and a transversely movable valve body which controls the air flow through an air inlet in the housing. The valve body includes cylindrical and conical shaped portions which cooperate with reciprocally shaped portions of the housing to provide flow control. A filter in the air inlet removes foreign matter from the air. The bottom end of the valve body is screwed into the valve housing control knob formed integrally with the valve body and controls translation of the valve body, and the opening and closing of the valve.

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

Official Gazette of the U.S. Patent and Trademark Office
ANTENNA GROUT REPLACEMENT SYSTEM Patent
Application
Charles E. McClung, inventor (to NASA) (JPL) Filed 10 Feb. 1981 16 p
(Contract NAS7-100)
NTIS HC A02/MF A01 CSCL 131

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

44 ENERGY PRODUCTION AND CONVERSION

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

For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels, and 86 Urban Technology and Transportation.

43 EARTH RESOURCES

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

For instrumentation see 35 Instrumentation and Photography.


METHOD FOR OBSERVING THE FEATURES CHARACTERIZING THE SURFACE OF A LAND MASS Patent
Robert D. Reed, inventor (to NASA) Issued 23 Dec. 1980 7 p Filed 30 May 1979 Supersedes N79-24979 (17 - 18, p 2073)

A method is described where a propeller driven, hydrazine powered aircraft is remotely piloted through rarefied atmosphere of a selected planet, including the planet Earth. It is employed as a communication platform for a telemetry system provided for relaying information relating to features characterizing the surface of the planet.

Official Gazette of the U.S. Patent and Trademark Office
N81-14389* National Aeronautics and Space Administration. Pasadena Office, Calif.

**METHOD AND APPARATUS FOR FABRICATING IMPROVED SOLAR CELL MODULES Patent**


A method and apparatus for fabricating an improved solar cell module is described. The apparatus includes a supply drum for feeding a flexible strip having etched electrical circuitry deposited on it. A supply drum is used for feeding into overlaying engagement with the flexible strip a flexible tape having a pair of exposed tacky surfaces, and a plurality of same for receiving and depositing a plurality of solar cells in side-by-side relation on an exposed tacky surface of the tape in electrical contacting engagement with the etched circuitry.

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

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N81-16528* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**HIGH VOLTAGE PLANAR MULTIJUNCTION Patent Application**


A solar cell which provides high output voltages, comprises a semiconductor wafer in which a number or array of voltage generating regions or unit cells are formed. Each of the unit cells has two regions of opposite conductivity type (e.g., n⁺ and p⁻) which are separated by a gap region. The unit cells are connected together by metal contacts so that their outputs are additive. Field regions, separated by gaps, overlie the unit cells. Cells are formed in both faces of the wafer; a circular wafer is employed.

N81-17518* National Aeronautics and Space Administration. Pasadena Office, Calif.

**SOLAR ENERGY RECEIVER FOR A STIRLING ENGINE Patent**


A solar energy receiver includes a separable endless wall formed of a ceramic material in which a cavity of substantially cylindrical configuration is defined for entrapping solar flux. An acceptance aperture is adapted to admit to the cavity a concentrated beam of solar energy. The wall is characterized by at least one pair of contiguous related segments separated by lines of cleavage intercepting the aperture. At least one of the
segments is supported for pivotal displacement. A thermal-responsive actuator is adapted to respond to excessive temperatures within the cavity for initiating pivoted displacement of one segment, whereby thermal flux is permitted to escape from the cavity. Official Gazette of the U.S. Patent and Trademark Office.

47 METEOROLOGY AND CLIMATOLOGY

COPPER DOPED POLYCRYSTALLINE SILICON SOLAR CELL Patent

Fabrication of improved performance photovoltaic cells is described. They are fabricated from polycrystalline silicon containing copper segregated at the grain boundaries. T.M.

47 METEOROLOGY AND CLIMATOLOGY

CAT ALTITUDE AVOIDANCE SYSTEM Patent Application

A method and apparatus are described for indicating the altitude of the tropopause or of an inversion layer in which clear air turbulence (CAT) may occur and the likely severity of any such CAT. A plot of altitude (with respect to an aircraft) versus temperature of the air at that altitude can indicate when an inversion layer is present and can indicate the altitude of the tropopause or of such an inversion layer. The plot can also indicate the severity of any CAT in an inversion layer. If CAT was detected in the general area, then the aircraft can be flown at an altitude to avoid the tropopause or inversion layer. The detection method can also be utilized to enable an aircraft to fly at an altitude at which the winds are most favorable for reducing fuel consumption. T.M.

IMPROVED THERMIonic ENERGY CONVERTERS Patent Application

The efficiency of thermionic energy converters is improved by reducing plasma losses. This is achieved by internal distribution of tiny shorted cesium diodes driven by the thermal gradient between the primary emitter and the collector. The tiny, shorted diode distribution comprises protrusions of the emitter material from the main emitter face which contact the main collector face thermally but not electrically. The main collector end of the protrusions are separated from the main collector by a thin layer of insulation, such as aluminum oxide. The diode effect will increase with the use of metals that adsorb cesium more readily for the main collector ends of the protrusions. Author

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.
MICRO-FLUID EXCHANGE COUPLING APPARATUS Patent
Avail: US Patent and Trademark Office CSCL 068

In a macro-fluid exchange, a hollow needle, such as a syringe needle, is provided for penetrating the fluid conduit of the animal. The syringe needle is coupled to a plenum chamber having an inlet and outlet port. The plenum chamber is coupled to the syringe needle via the intermediary of a standard quick disconnect coupling fitting. The plenum chamber is carried at the end of a drive rod which is coupled to a micrometer drive head. The micrometer drive head is slidably and pivotably coupled to a pedestal for adjusting the height and angle of inclination of the needle relative to a reference base support. The needle is positioned adjacent to the incised trachea or a blood vessel of a small animal and the micrometer drive head is operated for penetrating the fluid conduit of the animal.

SUBCUTANEOUS ELECTRODE STRUCTURE Patent

A subcutaneous electrode structure suitable for a chronic implant and for taking a low noise electrocardiogram of an active animal, comprises a thin inflexible, smooth disc of stainless steel having a diameter as of 5 to 30 mm, which is sutured in place to the animal being monitored. The disc electrode includes a radially directed slot extending in from the periphery of the disc for approximately 1/3 of the diameter. Electrical connection is made to the disc by means of a flexible lead wire that extends longitudinally of the slot and is woven through apertures in the disc and held at the terminal end by means of a spot welded tab. Within the slot, an electrically insulative sleeve, such as silicone rubber, is placed over the wire. The wire with the sleeve mounted thereon is captured in the plane of the disc and within the slot by means of crimping tabs extending laterally of the slot and over the insulative wire. The marginal lip of the slot area is apertured and an electrically insulative potting material such as silicone rubber, is potted in place overlaying the wire slot region and through the apertures.

ACOUSTIC TOOTH CLEANER Patent Application
Joseph S. Heyman, inventor (to NASA) Filed 14 Aug. 1980 13 p
(NASA-Case-LAR-12471-1; US-Patent-Appl-SN-178193) Avail: NTIS HC A02/MF A01 CSCL 068

An acoustic oral hygiene unit that uses acoustic energy to oscillate mild abrasive particles in a water suspension which is then directed in a low pressure stream onto the teeth is described. The oscillating abrasives scrub the teeth clean removing food particles, plaque, calculus, and other foreign material from tooth surfaces, interproximal areas, and tooth gingiva interface more effectively than any previous technique. The relatively low power output and the basic design make the invention safe and convenient for everyday use in the home without special training. This invention replaces all former means of home dental prophylaxis, and requires no augmentation to fulfill all requirements for daily oral hygienic care.

INDOMETH ACIN-ANTIHISTAMINE COMBINATION FOR GASTRIC ULCERATION CONTROL Patent
An anti-inflammatory and analgesic composition containing indomethacin and an H2 histamine receptor antagonist in an amount sufficient to reduce gastric distress caused by the indomethacin was developed. Usable antagonists are metiamide and cimetidine.

Several parameters of a small region of a muscle tissue or other object, can be simultaneously measured using with minimal traumatizing or damage of the object, a trifunctional transducer which can determine the force applied by a muscle fiber, the displacement of the fiber, and the change in thickness of the fiber. The transducer has three legs with inner ends joined together and outer ends formed to piece the tissue and remain within it. Two of the legs are relatively stiff, to measure force applied by the tissue, and a third leg is relatively flexible to measure displacement of the tissue relative to one or both stiff legs, and with the three legs lying in a common plane so that the force and displacement measurements all relate to the same direction of muscle movements. A flexible loop is attached to one of the stiff legs to measure changes in muscle thickness, with the upper end of the loop fixed to the leg and the lower end of the loop bearing against the surface of the tissue and being free to slide on the leg.

A technique for the redundant operation of counter modules is described. Redundant operation is maintained by detecting the zero state of each counter and clearing the other to that state, thus periodically resynchronizing the counters, and obtaining an output from both counters through ac coupled diode-OR gates. Redundant operation of counter flip flops is maintained in a similar manner, and synchronous operation of redundant squarewave clock generators of the feedback type is effected by connecting together the feedback inputs of the squarewave generators through a coupling resistor, and obtaining an output.
from both generators through ac coupled diode-OR gates.

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71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see 45 Environment Pollution.

N81-15767 National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
METHOD AND APPARATUS FOR SHAPING AND ENHANCING ACOUSTICAL LEVITATION FORCES Patent

A method and apparatus for enhancing and shaping acoustical levitation forces in a single-axis acoustic resonance system wherein specially shaped drivers and reflectors are utilized to enhance to levitation force and better contain fluid substance by means of field shaping is described.

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

N81-18681 National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
OPTICAL CRYSTAL TEMPERATURE GAUGE WITH FIBER OPTIC CONNECTIONS Patent Application

An optical temperature gauge is described which uses a semiconductor crystal that has a band edge shift property which is temperature dependent. An external narrow band light source provides optical excitation through an optical fiber and light energy thus passed through the crystal is conveyed by a second optical fiber to a light to electric transducer at an external location. The crystal is locatable in cryogenic or other systems, to provide remote read out. The light wavelength is varied (scanned) in a repetitive pattern in source and the instantaneous wavelength
passes over the band edge wavelength during each cycle of the
scan. The timing of that crossover is related to the temperature
of the crystal by electronic means. Several alternative elements
of instrumentation are disclosed. A variation in the basic
measurement apparatus is also disclosed, in which the band
gap voltage of a light source, such as a laser diode, is evaluated
at the time of band edge crossover in the crystal and converted
to a temperature value.

A system for generating, within a single frame of photographic
film, a quadrified image including images of angularly (including
orthogonally) related fields of view of a near field three dimensional
object is described. It is characterized by three subsystems each
of which includes a plurality of reflective surfaces for imaging a
different field of view of the object at a different quadrant of
the quadrified image. All of the subsystems have identical path
lengths to the object photographed.

Official Gazette of the U.S. Patent and Trademark Office
An interferometer of relatively simple design which is tilt compensated, and which facilitates adjustment of the path lengths of split light beams is described. The interferometer includes a pair of plate-like elements with a dielectric coating and an oil film between them, that forms a beamsplitter interface, and with a pair of reflector surfaces at the ends of the plates. A pair of retroreflectors are positioned so that each split beam component is directed by a retroreflector onto one of the reflector surfaces and is then returned to the beamsplitter interface, so that the reflector surfaces tilt in a direction and amount that compensates for tilting of the beamsplitter interface.

A character recognition system is disclosed in which each character in a retina, defining a scanning raster, is scanned with random lines uniformly distributed over the retina. For each type of character to be recognized the system stores a probability density function (PDF) of the random line intersection lengths and/or a PDF of the random line number of intersections. As an unknown character is scanned, the random line intersection lengths and/or the random line number of intersections are accumulated and based on a comparison with the prestored PDFs a classification of the unknown character is performed.
ELECTROMIGRATION PROCESS FOR THE PURIFICATION OF MOLTEN SILICON DURING CRYSTAL GROWTH

Patent Application


(Contract NAS7-100)

(TNASA-Case-NPO-14831-1: US-Patent-Appl-SN-233269) Avail:

NTIS HC A02/DF A01 CSCL 20B

A process for the purification of molten materials during crystal growth by electromigration of impurities to localized dirty zones has particular applications for silicon crystal growth according to Czochralski techniques and edge defined film fed growth (EFG) conditions. In the Czochralski crystal growing process, the impurities are electromigrated away from the crystallization interface by applying a direct electrical current to the molten silicon for electromigrating the charged impurities away from the crystal growth interface. In the EFG crystal growth process, a direct electrical current is applied between the two faces which are used in forming the molten silicon into a ribbon. The impurities are thereby migrated to one side only of the crystal ribbon. The impurities may be removed or left in place. If left in place, they will not adversely affect the ribbon when used in solar collectors. The migration of the impurity to one side only of the silicon ribbon is especially suitable for use with asymmetric dies which preferentially crystallize uncharged impurities along one side or face of the ribbon.
This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. This issue of the Abstract Section cites 130 patents and applications for patent introduced into the NASA scientific and technical information system during the period of January 1981 through July 1981. Each entry of the Abstract Section consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or application for patent.
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Details on the availability of these publications may be obtained from:

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