NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JULY 1979

CASE FILE COPY

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 Informatics Information Systems Company.
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 1979 and June 1979.
This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, at price code E04 ($7.50 domestic, $15.00 foreign)
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 240 citations published in this issue of the Abstract Section cover the period January 1979 through June 1979. The Index Section contains references to the 3632 citations covering the period May 1969 through June 1979.

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
These data elements in the citation of the abstract as depicted in the Typical Citation and Abstract reproduced below and are also used in the several indexes.

**TYPICAL CITATION AND ABSTRACT**

A cylindrically shaped enclosure has a source of alpha particles at one end and detectors mounted in tandem at the other end. Two downward-extending baffles and a blocking shield define a forward-scattering angular range in which scattering products from alpha particle/hydrogen and alpha particle/helium collisions can reach the detector's surface. The thickness of the detectors is sized so that alpha particles resulting from alpha particle/helium collisions are absorbed in the first detector and recoil protons resulting from alpha particle/hydrogen collisions pass through the first detector and are absorbed by the second detector. Each scattering product is identified from its ability to penetrate or not penetrate a detection material of predetermined thickness. The output pulses are processed by an electronic processing system. The apparatus could be carried by a planetary probe to one of the outer planets.
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.

PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

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

NASA patent application specifications are sold in paper copy by the National Technical Information Service at price code A02 ($4.00 domestic, $8.00 foreign). Microfiche are sold at price code A01 ($3.00 domestic, $4.50 foreign). The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

LICENSES FOR COMMERCIAL USE INQUIRIES AND APPLICATIONS FOR LICENSE

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

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

The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table. Formal application of license must be submitted on the NASA Form, Application for NASA Patent License, which is available upon request from any NASA Patent Counsel.
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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 Publication of NASA Inventions available for license.
1245.206 Application for nonexclusive licenses.
1245.207 Application for exclusive license.
1245.208 Royalties and fees.
1245.210 Reports.
1245.211 Reconsideration of licenses.
1245.212 Appeals.
1245.213 Litigation.
1245.214 Address of communications.

2. The provisions of this Subpart 2 issued under 42 U.S.C. 2457, 2478(b) (5), Contractor

§ 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) "To practice an invention" 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) "Practical 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 expedited granting of a nonexclusive license for practice of the invention by the public.

(e) "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 Administrator and Contributions Board" means the NASA Inventions and Contributions Board established by the Administrator of NASA within the NASA, 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 and monopoly 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) The "Inventions and Contributions Board" 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. It is the policy of NASA to seek exclusive licenses when such licenses will provide the necessary incentive to the licensee to achieve early 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. Consideration may also be given to assisting small businesses and minority business enterprises, as well as providing the necessary incentive or under a nonexclusive license to the public to apply for the exclusive license it is not likely to be achieved expeditiously by the further funding of the invention by the Government.

(d) All licenses for inventions shall be by express written instruments. No license shall be granted either expressly or by implication of a NASA invention except as provided for in §§ 1245.203 and 1245.204 and in any existing or future treaty or agreement between the United States and any foreign government.

(e) Licenses for inventions covered by NASA-owned foreign patents and patent applications licensed in accordance with the NASA Foreign Patent Licensing Regulations (§ 1245.4).

§ 1245.203 Licenses for practical application of inventions.

(a) General. As an incentive to encourage practical application of inventions, licenses will be granted to responsible applicants according to the circumstances and conditions set forth in this section.

(b) Nonexclusive licenses. (1) Each invention shall be made available to responsible applicants for nonexclusive, revocable licensing in accordance with this subpart and the provisions of any existing exclusive license.

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

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

(4) 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.

(5) The license shall extend to the subsidiaries and affiliates of the licensee and shall be nonassignable without approval of the Administrator, NASA, except to the successor of that part of the licensee's business to which the invention pertains.

(c) Short-form nonexclusive licenses. A nonexclusive, revocable license for a special invention, as defined in § 1245.201(d), shall be granted upon written request, to any applicant by the Patent Counsel of the NASA having cognizance of the invention.

(d) Exclusive licenses. (1) A limited exclusive license may be granted on an invention available for such licensing provided that:

(i) The Administrator has determined that (a) The invention has not been brought to practical application by a nonexclusive licensee in the fields of use or in the geographical locations covered by the application for the exclusive license, (b) practical application of the invention in the fields of use or geographical locations covered by the application for the exclusive license is not likely to be achieved expeditiously by the further funding of the invention by the Government, or under a nonexclusive license requested by any applicant pursuant to these regulations, and (c) the exclusive license will provide the necessary incentive or under a nonexclusive license to the public to apply for the exclusive license; and

(ii) Either a notice pursuant to
§ 1245.205 Publication of NASA inventions available for license.

(a) A notice will be periodically published in the Federal Register listing inventions available for licensing. Abstracts of the inventions will be published in the NASA Scientific and Technical Reports (STAR) and other NASA publications.

(b) Copies of pending patent applications for inventions abstracted in STAR may be purchased from the National Technical Information Service, Springfield, Va. 22151.

§ 1245.206 Application for nonexclusive license.

(a) Submission of application An application for nonexclusive license under § 1245.203(b) or a short-form nonexclusive license for special inventions under § 1245.203(c) shall be addressed to the NASA Assistant General Counsel for Patent Matters.

(b) Contents of an application for nonexclusive license. An application for nonexclusive license under § 1245.203(b) shall include:

1. Identification of invention for which license is desired.
2. In consideration of the settlement of an interference.
3. In consideration of a release of a claim of infringement.
4. In exchange for or as part of the consideration for a license under adversely held patent(s).
5. Terms of the nonexclusive license.
6. The manner in which the license is to be used.
7. The expiration date of the license.

§ 1245.207 Application for exclusive license.

(a) Submission of application An application for exclusive license under § 1245.203(d) may be submitted to NASA at any time. An application for exclusive license shall be addressed to the NASA Assistant General Counsel for Patent Matters.

(b) Contents of an application for exclusive license. In addition to the requirements set forth in § 1245.206(b), the application for an exclusive license shall include:

1. Applicant's status, if any, in any one or more of the following categories:
   (i) Small business firm;
   (ii) Minority business enterprise;
   (iii) Location in a surplus labor area;
   (iv) Location in a low-income urban area; and
   (v) Location in an area designated by the Government as economically depressed.

2. A statement indicating the time, expenditure, and other acts which the applicant considers necessary to achieve practical application of the invention, and the applicant's offer to invest that sum to perform such acts if the license is granted.

3. A statement whether the applicant would be willing to accept a license for all or less than all fields of use of the invention throughout the United States of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

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

5. Any other facts which the applicant believes to show it to be in the interests of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive li-
PATENT LICENSING REGULATIONS

3. Contributions Board receives in writing an exclusive license in accordance with the General Counsel.

4. An exclusive license is granted to the local States to grant the proposed exclusive license, or

5. An application for a nonexclusive license shall be granted in accordance with § 1245.206(a), in which applicant states that he has already brought 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.

(2) Recommendation of Inventions and Contributions Board. Upon the expiration of the period required by subparagraph (1) of this paragraph, the Board shall review all written responses to the notice and shall then recommend to the Administrator whether to grant the exclusive license as recommended by the Board. If the Administrator determines to revoke the license, the license will be granted upon the negotiation of the appropriate terms and conditions by the Office of General Counsel.

§ 1245.209 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 require the payment of royalties, fees or other consideration when the licensing circumstances and the basic considerations in § 1245.205, 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 § 1245.205 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 any cause, there will be furnished to 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 and request a hearing 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, findings of fact, and decision whether the license should be revoked 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 not affect all sublicences which have been granted.

§ 1245.312 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 before the Inventions and Contributions Board, and to present oral arguments in its defense. The procedures to be followed in any such matter 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 in its own name any person who infringes the rights set forth in its license and covered by the licensed patent. The licensee may join the Government as a party plaintiff, upon application to the Attorney General, as a party complainant in such suit, but without expense to the Government and the license shall pay court costs incurred by the Government in any suit that may be rendered against the Govern-
PATENT LICENSING REGULATIONS

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 OP, 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 *Aeronautics*

### 01 AERONAUTICS (GENERAL)  N.A.

### 02 AERODYNAMICS  1

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  2

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  2

Includes aircraft simulation technology

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

### 06 AIRCRAFT INSTRUMENTATION  N.A.

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  3

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  4

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

### 09 RESEARCH AND SUPPORT FACILITIES (AIR)  5

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, space transportation, spacecraft communications, command and tracking, spacecraft design, testing and performance, spacecraft instrumentation, and spacecraft propulsion and power

For related information see also *Aeronautics*

### 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  N.A.

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  6

Includes spacecraft thermal and environmental control, and attitude control

For related information see also *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 7
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 9
Includes laminates

25 INORGANIC AND PHYSICAL CHEMISTRY 10
Includes chemical analysis, e.g., chromatography, combustion theory, electrochemistry, and photochemistry
For related information see also 77 Thermodynamics and Statistical Physics

26 METALLIC MATERIALS 12
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion, and metallurgy

27 NONMETALLIC MATERIALS 13
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials

28 PROPELLANTS AND FUELS 15
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) 16
Includes vacuum technology, control engineering, display engineering, and cryogenics

32 COMMUNICATIONS 20
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 27
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 33
Includes boundary layers, hydrodynamics, fluids, mass transfer, and ablation cooling
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics

35 INSTRUMENTATION AND PHOTOGRAPHY 35
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 40
Includes parametric amplifiers

37 MECHANICAL ENGINEERING 41
Includes auxiliary systems (non-power), machine elements and processes, and mechanical equipment

38 QUALITY ASSURANCE AND RELIABILITY 48
Includes product sampling procedures and techniques, and quality control

39 STRUCTURAL MECHANICS N.A.
Includes structural element design and weight analysis, fatigue, and thermal stress
For applications see 05 Aircraft Design, Testing and Performance and 18 Spacecraft Design, Testing and Performance

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

42 GEOSCIENCES (GENERAL) N.A.
43 EARTH RESOURCES
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
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
Includes air, noise, thermal and water pollution, environment monitoring, and contamination control

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

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

48 OCEANOGRAPHY
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)
Includes genetics

52 AEROSPACE MEDICINE
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
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 63
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  63
   Includes sound generation, transmission, and attenuation
   For noise pollution see 45 Environment Pollution

72 ATOMIC AND MOLECULAR PHYSICS  64
   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  64
   Includes light phenomena

75 PLASMA PHYSICS  67
   Includes magnetohydrodynamics and plasma fusion
   For ionospheric plasmas see 46 Geophysics
   For space plasmas see 90 Astrophysics

76 SOLID-STATE PHYSICS  68
   Includes superconductivity
   For related information see also 33 Electronics and Electrical Engineering
   and 36 Lasers and Masers

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

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

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

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

82 DOCUMENTATION AND INFORMATION SCIENCE  N.A.
   Includes information storage and retrieval technology, micrography,
   and library science
   For computer documentation see 61 Computer Programming and Software

83 ECONOMICS AND COST ANALYSIS  N.A.
   Includes cost effectiveness studies

84 LAW AND POLITICAL SCIENCE  N.A.
   Includes space law, international law, international cooperation,
   and patent policy

85 URBAN TECHNOLOGY AND TRANSPORTATION  70
   Includes applications of space technology to urban problems,
technology transfer, technology assessment, and surface and mass transportation
   For related information see 03 Air Transportation and Safety, 16 Space Transportation,
   and 44 Energy Production and Conversion

SPACE SCIENCES
   Includes space sciences (general), astronomy, astrophysics, lunar
   and planetary exploration, solar physics, and space radiation
   For related information see also Geosciences

88 SPACE SCIENCES (GENERAL)  N.A.

89 ASTRONOMY  70
   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
A Semiannual Publication of the National Aeronautics and Space Administration

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

Airflow is passed over a wing surface. A scanning valve is adjusted so that a pneumatic tube extending from an orifice is connected via a pneumatic tube to an accelerometer and to a pressure transducer. As air passes over the orifice the pressure and noise levels are measured by the two instruments and recorded by a data acquisition system. The noise may also be heard via audio output and recorded by audio tape. The scanning valve is then adjusted so that the pneumatic tube extending from the orifice is connected via the pneumatic tube to the pressure transducer and to the accelerometer. The pressure and noise measurements are taken for the orifice. In the same manner the scanning valve subsequently connects each of the remaining orifices one at a time to the measuring and recording apparatus. The laminar to turbulent boundary is determined easily by visual inspection of the resulting graph. The need for an operator to be in the wind tunnel is eliminated and pressure measurements made simultaneously with the noise level measurements NASA

A pressure measuring system is described for use in obtaining in-flight wing profile drag measurements for low values of dynamic pressure and Reynolds number. The system is supported by a wing in flight which has a total pressure head arranged in spaced relation with a wake (as the wake is generated by the wing) and a reference static pressure head adapted to be displayed along an accurate path through the wake. A total pressure port and a static pressure port are included. A differential transducer is connected to the heads through a pressure switching device provided to selectively connect the heads to the transducer in opposed relation. Thus a single differential transducer is adapted to be utilized in obtaining differential pressure measurements for the wake NASA

An apparatus is presented for alleviating high angle-of-attack side force on slender pointed cylindrical forebodies such as fighter aircraft missiles and the like employing a symmetrical pair of helical separation trips to disrupt the leeside vortices normally attained. The novelty of the invention appears to reside in the use of a pair of symmetrical separation trips to force boundary layer separation and thereby disrupt the leeside vortices normally attained on slender pointed cylindrical forebodies such as fighter
04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Incorporates 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.

N79-10039* National Aeronautics and Space Administration Pasadena Office Calif
INTERFEROMETRIC LOCATING SYSTEM Patent Application
Peter F MacDoran inventor (to NASA) (JPL) Filed 31 Aug 1978 23 p
(Contract NAS7-100)

A free wing is attached to a fuselage of an aircraft in a manner such that the wing is free to pivot about a spanwise axis forward of its aerodynamic center. The wing is angularly displaced about the axis by aerodynamic pitching moments, resulting from lift, and is trimmed through the use of a trimmable free stabilizer comprising a floating canard mounted on a strut rigidly connected to the wing and projected forward from it.

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

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.
supported thereby for simultaneous axial and angular displacement as centrifugal forces are applied a pitch controller plus a plurality of pivotal pitch limiting arms transversely related to the spar A push-pull link interconnecting the arms is used for imparting simultaneous pivotal motion whereby the angular relationship of the arms to the spar is varied for varying the motion of the trucks along the arms for thus limiting the pitch of the segments about the spar

Official Gazette of the U S Patent and Trademark Office

07 AIRCRAFT PROPULSION AND POWER

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

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

N79-10067* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio APPARATUS AND METHOD FOR REDUCING THERMAL STRESS IN A TURBINE ROTOR Patent


A gas turbine is described wherein the thermal stresses in the turbine rotor are reduced. The rotor includes a central disc with a peripheral rim and a plurality of blades extending radially outward from the rim. To reduce thermal stresses a duct arrangement is provided which selectively directs hot gases from the turbine combustor to the rim during the turbine start up. The hot gases from the combustor serve to heat the rim and decrease the start up period necessary to bring the temperature profile of the rotor into the operating temperature range. After the start up period the duct arrangement is then used to direct cool gases from the turbine compressor to the rim of the rotor in order to maintain a lower rotor equilibrium temperature.

Official Gazette of the U S Patent and Trademark Office

N79-14095* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio CAM-OPERATED PITCH-CHANGE APPARATUS Patent


A pitch-change apparatus for a ducted thrust fan having a plurality of variable pitch blades employs a camming ring mounted coaxially at the hub at an axially fixed station along the hub axis for rotation about the hub axis both with the blades and relative to the blades. The ring has a generally spherical outer periphery and a plurality of helical camming grooves extending in a generally spherical plane on the periphery. Each of the variable pitch blades is connected to a pitch-change horn having a cam follower mounted on its outer end and the camming ring and the horns are so arranged about the hub axis that the plurality of followers on the horns engage respectively the plurality of helical camming grooves. Rotary drive means rotates the camming ring relative to the blades to cause blade pitch to be changed through the cooperative operation of the camming grooves on the ring and the cam followers on the pitch-change horns.

Official Gazette of the U S Patent and Trademark Office

N79-14096* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio INTEGRATED GAS TURBINE ENGINE-NACELLE Patent


A nacelle for use with a gas turbine engine is provided with an integral webbed structure resembling a spoke wheel for rigidly interconnecting the nacelle and engine. The nacelle is entirely supported in its spatial relationship with the engine by means of the webbed structure. The inner surface of the nacelle defines the outer limits of the engine motive fluid flow annulus.
while the outer surface of the nacelle defines a streamlined envelope for the engine

VARIABLE AREA EXHAUST NOZZLE Patent

An exhaust nozzle for a gas turbine engine comprises a number of arcuate flaps pivotally connected to the trailing edge of a cylindrical casing which houses the engine. Seals disposed within the flaps are spring biased and extensible beyond the side edges of the flaps. The seals of adjacent flaps are maintained in sealing engagement with each other when the flaps are adjusted between positions defining minimum nozzle flow area and the cruise position. Extensible spring biased seals are also disposed within the flaps adjacent to a supporting pylon to thereby engage the pylon in a sealing arrangement. The flaps are hinged to the casing at the central portion of the flaps leading edges and are connected to actuators at opposed outer portions of the leading edges to thereby maximize the mechanical advantage in the actuation of the flaps.

VORTEX-LIFT ROLL-CONTROL DEVICE Patent

A wing is described for aircraft of cropped arrow-type planform with thin leading and side edges. The wing has a pivotable tip to alter the crop angle of the wing during flight. Increasing the crop angle causes the wing side edge to become a trailing edge which reduces the strength of the side edge vortex flow. Decreasing the crop angle causes opposite results, in particular the side edge is now a leading edge and can generate a leading edge vortex flow. The wing constitutes a roll control device for aircraft of the stated design particularly effective at higher angles of attack.

COMPENSATING LINKAGE FOR MAIN ROTOR CONTROL Patent Application

A helicopter rotor control system is described which will automatically compensate for unwanted signal inputs due to relative movement between an airframe structure and a rotor and transmission which is isolated from the airframe structure by a hydraulic cushion. The rotor control signal is transmitted to a summing linkage by means of a control rod. The summing linkage moves the inner rod by an amount proportional to the control signal which in turn adjusts the actuating rod by means of a bellcrank. The relative motion of transmission is passed to the outer compensating rod by a bracket. The compensating rod adjusts a summing link which moves the inner rod by an amount proportional to the relative motion of transmission. Thus relative motion of transmission is prevented from moving.
the actuator rod and sending false control signals to the hydraulic actuators which change the pitch of the helicopter rotor blades. NASA

N79-20136# National Aeronautics and Space Administration Langley Research Center Hampton, Va
A VELOCITY VECTOR CONTROL SYSTEM AUGMENTED WITH DIRECT LIFT CONTROL Patent Application
A pilot controlled stability control system is described that employs direct lift control (spoiler control) with elevator control to control the flight path angle of an aircraft. A computer on the aircraft generates an elevator control signal and a spoiler control signal, using a pilot-controlled pitch control signal and pitch rate, vertical velocity roll angle groundspeed engine pressure ratio and vertical acceleration signals which are generated on the aircraft. The direct lift control by the aircraft spoilers improves the response of the aircraft flight path angle and provides short term flight path stabilization against environmental disturbances. NASA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

N79-10069# National Aeronautics and Space Administration Hugh L Dryden Flight Research Center Edwards Calif
TOW BAR FOR AIRCRAFT Patent Application
The tow bar of the instant invention includes a rigid elongated beam having a hitch located at each of its opposite ends for accommodating a coupling of the tow bar between a gear truck and a towing vehicle. Interposed between the center mass of the tow bar and the end thereof to be connected with a gear truck there is provided a wheel transport assembly including wheels which serve as a fulcrum for the tow bar as one end is elevated for facilitating a coupling of the tow bar to a gear truck and a manually operable hydraulic jack for elevating the opposite end of the beam sufficiently for facilitating a hook-up with a towing vehicle, as well as to clear the transport wheels.
from engagement with the supporting surface of the aircraft. By employing the tow bar of the instant invention it was found that one man can effect a coupling of the tow bar with a given aircraft in even less time than four to six men.

N79-21083* National Aeronautics and Space Administration Langley Research Center, Hampton Va
WIND TUNNEL Patent
A supersonic wind tunnel is described for testing several airfoils mounted in a row. A test section of a wind tunnel contains means for mounting airfoil sections in a row means for rotating each section about an axis so that the angle of attack of each section changes with the other sections, and means for rotating the row with respect to the air stream so that the row forms an oblique angle with the air stream.

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.

N79-11108* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville Ala
APPARATUS FOR ASSEMBLING SPACE STRUCTURE Patent
An apparatus for producing a structure in outer space from rolls of prepunched ribbon or sheet material that are transported from the earth to the apparatus located in outer space is described. The apparatus spins the space structure similar to a spider spinning a web utilizing the prepunched ribbon material. The prepunched ribbon material is fed through the apparatus and is shaped into a predetermined channel-shaped configuration. Trusses are punched out of the ribbon and are bent downwardly and attached to a track which normally is a previously laid sheet of material. The size of the overall space structure may be increased by merely attaching an additional roll of sheet material to the apparatus.
A power control circuit connected between a solar array and an ion thruster receives voltage and current signals from the solar array. The control circuit multiplies the voltage and current signals together to produce a power signal which is differentiated with respect to time. The differentiator output is detected by a zero crossing detector and after suitable shaping, the detector output is phase compared with a clock in a phase demodulator. An integrator receives no output from the phase demodulator when the operating point is at the maximum power but is driven toward the maximum power point for non-optimum operation. A ramp generator provides minor variations in the beam current reference signal produced by the integrator in order to obtain the first derivative of power.
A high number of liquid oxygen and gaseous hydrogen orifices per unit area are provided in an injector head designed to give intimate mixing and more thorough combustion. The injector head comprises a main body portion, a cooperating plate member as a flow chamber for one propellant, a cooperating manifold portion for the second propellant, and an annular end plate for enclosing an annular propellant groove formed around the outer edge of the body. All the openings for one propellant are located at the same angle with respect to a radial plane to permit a short combustion chamber.

A process is described for the preparation of composite laminate structures of glass cloth preimpregnated with polybismaleimide resin and adhered to a polybismaleimide glass or aromatic polyamide paper honeycomb cell structure that is filled or partially filled with a syntactic foam consisting of a mixture of bismaleimide resin and carbon microballoons. The carbon microballoons are prepared by pyrolyzing phenolic microballoons and subsequently bonded using a 2% bismaleimide solution. The laminate structures are cured for two hours at 477 deg K and are adhered to the honeycomb bismaleimide adhesive using a pressure of 700 KN/sq m pressure at 450 deg K. The laminate composite is then post-cured for two hours at 527 deg K to produce a composite laminate having a density in the range from about 95 kilograms per cubic meter to 130 kilograms per cubic meter.

Light-weight insulation batting such as alumina/zirconia or preferably saffil high-temperature insulation alumina fiber is precut into oversized elongated shapes. These shapes are saturated in an acrylic polymer resin in water 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 matched to a particular required shape and required dimensions for installation in wire-mesh sleeving or any cavity requiring the heat-barrier seal to be provided. 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 wire-mesh sleeving if the insulation material is to be used as a heat seal around an openable door or hatch of a recoverable space vehicle.
24 COMPOSITE MATERIALS

N79-17916* National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio

METHOD OF MAKING BEARING MATERIALS Patent

A method is described for making a composite material which provides low friction surfaces for materials in rolling or sliding contact The composite material which is self-lubricating and oxidation resistant up to and in excess of about 930 C is comprised of a metal component which lends strength and elasticity to the structure and a fluorine salt component which provides oxidation protection to the metal but may also enhance the lubrication qualities of the composite on a cold surface backfilling the chamber with a dry inert gas and finally recovering the calcium superoxide produced

Official Gazette of the U S Patent Office

N79-10163* National Aeronautics and Space Administration Pasadena Office Calif

PORTABLE ELECTROPHORESIS APPARATUS USING MINIMUM ELECTROLYTE Patent

An electrophoresis unit for use in conducting electrophoretic analysis of specimens is described The unit includes a sealable container in which a substrate mounted specimen is suspended in an electrolytic vapor A heating unit is employed to heat a supply of electrolyte to produce the vapor The substrate is suspended within the container by being attached between a pair of clips which also serve as electrodes to which a direct current power source may be connected

Official Gazette of the U S Patent Office

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

N79-10182* National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

PROCESS FOR THE PREPARATION OF CALCIUM SUPEROXIDE Patent

Calcium superoxide is prepared in high yields by spreading a quantity of calcium peroxide diperioxidehydrate on the surface of a container positioning said container in a vacuum chamber on a support structure through which a coolant fluid can be circulated partially evacuating said vacuum chamber allowing the temperature of the diperioxidehydrate to reach the range of about 0 to about 40 C maintaining the temperature selected for a period of time sufficient to complete the disproportionation of the diperioxidehydrate to calcium superoxide calcium hydroxide, oxygen and water constantly and systematically removing the water as it is formed by sweeping the reacting material with a current of dry inert gas and/or by condensation of said water

N79-10167* National Aeronautics and Space Administration Pasadena Office Calif

OZONATION OF COOLING TOWER WATERS Patent
Application
Marshall F Humphrey (JPL) Kenneth R French (JPL) and Ronald
This invention relates to inhibition of corrosion and algae in heat exchange water streams. The previously used chromium additives did little to prevent biological growth and though effective and inexpensive in protecting metals from corrosion, its use was restricted due to environmental problems. Ozone was utilized at low levels in conjunction with other additives to control bacteria and microorganisms.

N79-10168* National Aeronautics and Space Administration
Pasadena Office, Calif
A PROCESS FOR CONVERTING AMORPHOUS TO CRYSTALLINE SILICON WITH ATTENDANT PURIFICATION
Patent Application
(Contract JPL-954442)
(NASA-Case-NPO-14223-1 US-Patent-Appl-SN-938580) Avail NTIS HC A02/MF A01 CSCL 07D
The invention relates to a process for converting amorphous to crystalline silicon with attendant purification. The invention is embodied in a process wherein amorphous silicon is heated to a temperature above approximately 730 deg in vacuo for initiating exothermic conversion of the amorphous silicon to silicon in its dendritic form accompanied by an instantaneous expulsion of impurities whereby the purity of the resultant silicon is enhanced.

N79-11152* National Aeronautics and Space Administration
Pasadena Office, Calif
SURFACTANT-ASSISTED LIQUEFACTION OF PARTICULATE CARBONACEOUS SUBSTANCES
Patent
A slurry of carbonaceous particles such as coal containing an oil soluble polar substituted oleophilic surfactant suitably an amine substituted long chain hydrocarbon is liquefied at high temperature and high hydrogen presence. The pressure of surfactant results in an increase in yield, and the conversion product contains a higher proportion of light and heavy oils and less asphaltene than products from other liquefaction processes.

N79-11151* National Aeronautics and Space Administration
Pasadena Office, Calif
COMBUSTER Patent
Richard A. McKay inventor (to NASA) (JPL) Issued 1 Aug 1978 7 p Filed 26 Nov 1976 Sponsored by NASA
A combuster is provided for utilizing a combustible mixture containing fuel and air to heat a load fluid such as water or air in a manner that minimizes the formation of nitrogen oxide. The combustible mixture passes through a small diameter tube where the mixture is heated to its combustion temperature while the load fluid flows past the outside of the tube to receive heat. The tube is of a diameter small enough that the combustible mixture cannot form a flame, and yet is not subject to wall quench so that combustion occurs but at a temperature less than under free flame conditions. Most of the heat required for the combustible mixture to its combustion temperature is obtained from heat flow through the walls of the pipe to the mixture.
A self-supporting sheet structure comprising a water soluble, non-cross-linked polymer, such as polyvinyl alcohol, is reported which is capable of being cross-linked by reaction with hydrogen atom radicals and hydroxyl molecule radicals in an aqueous solution having a pH of less than 8 and containing a dissolved salt in an amount sufficient to prevent dissolution of the non-cross-linked polymer. The aqueous solution is then irradiated with ionizing radiation to form hydrogen atom radicals and hydroxyl molecule radicals. The irradiation is continued for a time sufficient to produce a water-insoluble polymer sheet structure. The method has particular application in the production of battery separators and electrode envelopes for alkaline batteries.

**26 METALLIC MATERIALS**

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

**N79-16943** National Aeronautics and Space Administration

Marshall Space Flight Center, Huntsville Ala

PREPARATION OF MONOTECTIC ALLOYS HAVING A...
CONTROLLED MICROSTRUCTURE BY DIRECTIONAL SOLIDIFICATION UNDER DOPANT-INDUCED INTERFACE BREAKDOWN Patent Application
Richard A Parr, Mary H Johnston and John C McClure inventors (to NASA) Filed 29 Dec 1978 19 p

Monotectic alloys having aligned spherical particles or rods of the minor component dispersed in a matrix of the major component, are prepared by forming a melt containing predetermined amounts of the major and minor components of a chosen monotectic system. A dopant is provided capable of breaking down the liquid-solid interface for the chosen alloy, and directionally solidifying the melt at a selected temperature gradient and a selected rate of movement of the liquid-solid interface (growth rate). Shaping of the minor component into spheres or rods and the spacing there-between are controlled by the amount of dopant, the temperature gradient and growth rate values. Specific alloy systems include Al-Bi, Al-Pb and Zn-Bi, using a transition element such as iron.

N79-19145# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
HIGH TOUGHNESS-HIGH STRENGTH IRON ALLOY Patent Application
J R Stephens and W R Witzke, inventors (to NASA) 25 Jan 1979 11 p

An improved steel alloy is described which exhibits both high toughness and high strength at cryogenic temperatures. The alloy consists essentially of about 10 to 16 percent by weight nickel up to 10 percent by weight aluminum and up to about 3 percent by weight of at least one of the following additional elements: copper, lanthanum, niobium, tantalum, titanium, vanadium, yttrium, zirconium and the rare earth metals, with the balance being essentially iron. The steel alloy is produced by a process which includes using cold rolling at room temperature and subsequent heat treatment at temperatures ranging from 500 deg to 650 C. The alloy possesses a fracture toughness ranging from 200 to 230 ksi in and yield strengths up to 230 ksi.

N79-11216# National Aeronautics and Space Administration Ames Research Center Moffett Field Calif
AMBIENT CURE POLYIMIDE FOAMS Patent Application

Flame and temperature resistant polyimide foams are prepared by the reaction of an aromatic dianhydride (pyromellitic dianhydride) with an aromatic polyisocyanate (polymethylene polyphenylisocyanate), in the presence of an inorganic acid and furfuryl alcohol. Usable acids include dilute sulfuric acid, dilute nitric acid, hydrochloric acid, polyphosphonic acid, and phosphoric acid with the latter being preferred. The dianhydride and the isocyanate in about equimolar proportions constitute about 50% of the reaction mixture. The resulting foam is then compressed to less than 20% of its initial thickness. The mixture can be sprayed on any surface to form polymeric foam in locations where the application of heat is not practical or possible, for instance between walls or on mine tunnel surfaces.

N79-21183# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston Tex
SURFACE FINISHING Patent Application

A manufacturing process is described which reduces or eliminates air turbulence created by surface irregularities in metal airfoils due to rivets, wrinkles or butt-joints. The metal surface of the airfoil is cleaned, then coated with a thin layer of a fluid adhesive over which a sheet of thin plastic film is stretched. Tension is applied to the film and the resultant surface is then squeezed to cause the adhesive to conform to the irregularities remove any bubbles, and smooth out any wrinkles in the film. The adhesive is then allowed to set. The resulting surface is smooth and relatively free of the normal irregularities present in the standard metal airfoil, particularly for low speed aircraft.

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

N79-11216# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
MODIFICATION OF THE ELECTRICAL AND OPTICAL PROPERTIES OF POLYMERS Patent Application
M J Mirtich and James S Sovey inventors (to NASA) Filed 7 Nov 1978 11 p
(NASA-Case-LEW-13027-1 US-Patent-App1-SN-958575) Avail NTIS HC A02/MF A01 CSCL 07C

27 NONMETALLIC MATERIALS
Includes physical, chemical and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives and ceramic materials.
The surface of a polymer is irradiated to modify the optical and electrical properties as well as to change the surface morphology. A polymer is placed in a vacuum of about 4 x 10 to the minus 5th power torr. A surface of the polymer is exposed to a beam of argon ions having an energy between 500 and 1000 eV and an ion beam current density between 0.1 and 1.0 mA/sq cm. The resulting texturing of the surface causes a large decrease in spectral transmittance at all wavelengths. The surface conductivity of the polymer is also increased. The textured surface further enhances the adherence of thin films to the polymer. A polyimide, (Kaplan), and a fluorinated ethylene propylene (Teflon) are surface treated in accordance with the invention.

**N79-12221* National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex.**

**THERMAL INSULATION ATTACHING MEANS Patent**


An improved isolation system is provided for attaching ceramic tiles of insulating material to the surface of a structure to be protected against extreme temperatures of the nature expected to be encountered by the space shuttle orbiter. This system isolates the fragile ceramic tiles from thermally and mechanically induced vehicle structural strains. The insulating tiles are affixed to a felt isolation pad formed of closely arranged and randomly oriented fibers by means of a flexible adhesive and in turn the felt pad is affixed to the metallic vehicle structure by an additional layer of flexible adhesive.

**N79-14214* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.**

**PREPARATION OF DIELECTRIC COATING OF VARIABLE DIELECTRIC CONSTANT BY PLASMA POLYMERIZATION Patent**


A plasma polymerization process for the deposition of a dielectric polymer coating on a substrate comprising disposing of the substrate in a closed reactor between two temperature controlled electrodes connected to a power supply is presented. A vacuum is maintained within the closed reactor, causing a monomer gas or gas mixture of a monomer and diluent to flow into the reactor generating a plasma between the electrodes. The vacuum varies and controls the dielectric constant of the polymer coating being deposited by regulating the gas total and...
partial pressure, the electric field strength and frequency, and the current density. Official Gazette of the U.S. Patent and Trademark Office

N79-18052* National Aeronautics and Space Administration Ames Research Center Moffett Field Calif.

**OXYGEN POST-TREATMENT OF PLASTIC SURFACE COATED WITH PLASMA POLYMERIZED SILICON-CONTAINING MONOMERS Patent**


The abrasion resistance of plastic surfaces coated with polymerized organosilanes can be significantly improved by post-treatment of the polymerized silane in an oxygen plasma. For optical purposes, the advantages of this post-treatment are developed with a transparent polycarbonate resin substrate coated with plasma polymerized vinylmethoxysilane.

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

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N79-19160* National Aeronautics and Space Administration Langley Research Center Hampton, Va.

**MIXED DIAMINES FOR LOWER MELTING ADDITION POLYIMIDE PREPARATION AND UTILIZATION Patent Application**


An essentially solventless process is presented for preparing addition type polyimide prepreg that retains good drape, tack and other mechanical properties.

NASA

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N79-10224* National Aeronautics and Space Administration Pasadena Office Calif.

**SILICONE CONTAINING SOLID PROPELLANT Patent Application**


The invention relates to elimination of aluminum oxide slag deposit in the nozzle throat of laboratory scale end burner units utilized in developmental programs which interferes with testing of metal containing solid rocket propellant for L-star instability characteristics. Addition of a small amount of a liquid silicone oil to a metal containing solid rocket propellant provides a significant reduction in heat transfer to the inert nozzle walls eliminating or reducing metal oxide slag collection and blockage of the nozzle throat. It was further discovered that the burning...
rate of these propellants is increased by about 5 to 10% providing improved ballistic performance

N79-10225* National Aeronautics and Space Administration
Pasadena Office Calif

RECOVERY OF ALUMINUM AND BINDER FROM COMPOSITE PROPELLANTS Patent Application
Graham C Shaw inventor (to NASA) (Thiokol Chemical Corp
Bingham City Utah) Filed 29 Sep 1978 14 p
(Contract JPL-954161)

The metal fuel powder and the resin are recovered from propellant binder containing less than 15% oxidizer salt by dissolution of the binder in an active transesterification solvent such as an aliphatic solution of an alkali metal alkoxide of the formula MOR where M is an alkali metal suitably sodium or potassium and R is an alkyl group containing 1 to 6 carbon atoms. The alcohol is an alkanol containing 1 to 6 carbon atoms. When moisture is excluded from the system the highly basic alkyl oxide radical has little effect upon the Al present but reacts very rapidly with the binder. Mixed solvents of either methanol and tetrahydofuran or tetrahydofuran and toluene were effective in the transesterification reaction. The products of the reaction were soluble in toluene. Washing the binder from the Al generally resulted in the recovery of 98.7 to 99.7% of the theoretical amount. Analysis for active aluminum content ranged from 98.5 to 98%.

The low oxidizer aluminum-binder residue is obtained by an aqueous leach of the scrap propellant.

N79-10227* National Aeronautics and Space Administration
Pasadena Office Calif

PROCESS FOR THE LEACHING OF AP FROM PROPELLANT Patent Application
Graham C Shaw (Thiokol Corp Bingham City Utah) and Meldon J. McIntosh inventors (to NASA) (Thiokol Corp Bingham City Utah) Filed 29 Sep 1978 17 p
(Contract JPL-954161)

This invention relates to the recovery of inorganic oxidizing salt such as ammonium perchlorate (AP) from waste propellant. In a method of recovery of AP by leaching the chunks agglomerate requiring continuous high energy mixing. In the invention the agglomeration of the propellant is prevented by the addition of surface active agents which are absorbed upon the propellant binder surfaces reducing the tacky nature of the exposed surfaces. The power required to mix the water slurred propellant was less than 1/50th that required to mix the pyrotechnic materials having the tacky nature of the wet agglomerated propellant and not containing the dispersing agent. Extraction of up to 98% AP was achieved from slurries containing over 40% propellant. The chemical purity of the recovered AP is acceptable for reuse in propellant compositions for resale or for use in slurred explosives.

N79-11231* National Aeronautics and Space Administration
Pasadena Office Calif

ELECTROEXPLOSIVE DEVICE Patent
Vincent J Menichelli inventor (to NASA) (JPL) Issued 1 Aug 1978 7 p Filed 8 Nov 1976 Supersedes N77-17258 (15 p 1012) Sponsered by NASA

An electroexplosive device is presented which employs a header having contact pins hermetically sealed with glass passing through from a connector end of the header to a cavity filled with a shunt layer of a new nonlinear resistive composition and a heat-sink layer of a new dielectric composition having good thermal conductivity and capacity. The nonlinear resistive layer and the heat-sink layer are prepared from materials by mixing with a low temperature polymerizing resin. The resin is dissolved in a suitable solvent and later evaporated. The resultant solid composite is ground into a powder press formed into the header and cured (polymerized) at about 250 to 300 F.

N79-14228* National Aeronautics and Space Administration
Pasadena Office Calif

INHIBITED SOLID PROPELLANT COMPOSITION CONTAINING BERYLLIUM HYDRIDE Patent
Wallace W Thompson inventor (to NASA) (JPL) Issued 5 Sep 1978 3 p Filed 5 Aug 1969 Sponsored by NASA
(NASA-Case-NPO-10866-1 US-Patent-4 111 729

An object of this invention is to provide a composition of beryllium hydride and carboxy-terminated polybutadiene which is stable. Another object of this invention is to provide a method for inhibiting the reactivity of beryllium hydride toward carboxy-terminated polybutadiene. It was found that a small amount of lecithin inhibits the reaction of beryllium hydride with the acid groups in carboxy-terminated polybutadiene.

N79-10246* National Aeronautics and Space Administration
Pasadena Office Calif

AN IMPROVED SYSTEM FOR SLICING SILICON WAFERS Patent Application
Earl R Collins inventor (to NASA) Filed 16 Oct 1978 17 p (Contract NAS7-100)

A system is presented for simultaneously slicing from a plurality of silicon boules arranged in side-by-side relation a multiplicity of high-grade wafers for use in the semiconductor industry. The system includes a plurality of band saw blades supported for simultaneous unidirectional displacement along
parallel courses extending through a common cutting station. The blades are provided with serrations the purpose of which is to transport a cutting slurry picked up at jets for enhancing cutting operation. Each of the blades is supported at the cutting station by a plurality of guides driven in rotation in a manner such that the guides are angularly displaced through 180 degrees during each cutting operation for continuously presenting to the blade regenerated supporting surfaces whereby blade wobble is reduced.

NOZZLE EXTRACTION PROCESS AND HANDLEMETER FOR MEASURING HANDLE

Vernon L. Alley Jr. and Austin D. McHatton inventors (to NASA)

Issued 1 Aug 1978 13 p Filed 19 Oct 1976 Supersedes N77-10198 (15-01 p 0031)

Method and apparatus for quantitatively measuring the handle of fabrics and other flexible materials is presented. Handle is that term used to refer to the qualities of drapability, flexibility, compressibility, foldability, stretchability, pliability, etc., possessed by fabrics and other flexible materials. In the present invention, the handle of a material sample is quantified by measuring the force required to draw the sample through an orifice and expressing the resultant extractive force as a function of test apparatus geometry and the amount of sample drawn through the orifice to arrive at a quantitative measure of handle to be defined as handle modulus for the sample in question.

SUPPORT ASSEMBLY FOR CRYOGENICALLY COOLABLE LOW-NOISE CHOKED WAVEGUIDE

Frank E. McCrea inventor (to NASA) (JPL) Filed 31 Aug 1978 11 p

An assembly that has low noise characteristics and low heat transfer for supporting a waveguide through cryogenically cooled space is presented. The novelty of the invention resides in the use of stainless steel tubes to support a waveguide from a mounting plate in the manner described to provide a thermal conduction path of high impedance with such structural rigidity that the waveguide is held with the proper choke gap and in proper alignment. These structures can be used in tandem to support a waveguide through two cooling stages at vastly different temperatures such as 300 K outside, 4 K inside, and 70 K in the intermediate stage.

METHOD AND TOOL FOR MACHINING A TRANSVERSE SLOT ABOUT A BORE

Manuel A. David-Malig inventor (to NASA) (United Aircraft Corp Sunnyvale Calif) Filed 17 Oct 1978 11 p Sponsored by NASA

A machining tool is described for cutting transverse slots in solid rocket motor casings. The cutting tool mounted on a milling machine is positioned into the bore of a rocket motor by a vertical feed mechanism. The rocket motor mounted on rotating table is rotated as the cutting head being tightly held against.
shaft by tensioned cable is moved transversely into the wall to cut a slot. Maximum slot depth is reached when the shaft of the tool is in proximity to the wall of the bore. To increase slot depth machining, the cable is slackened and the tool is backed off to allow the insertion of another spacer. The cable is tightened, and the steps of cutting, backing off, and adding spacers are repeated until the desired depth of the slot is reached.

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N79-17029 National Aeronautics and Space Administration
Goddard Space Flight Center, Greenbelt, Md

**THERMAL COMPENSATOR FOR CLOSED-CYCLE HELIUM REFRIGERATOR Patent**

The wavelength of an infrared semiconductor laser diode having an output frequency that is dependent on the diode temperature is maintained substantially constant by maintaining the diode temperature constant. The diode is carried by a cold tip of a closed cycle helium refrigerator. The refrigerator has a tendency to cause the temperature of the cold tip to oscillate. A heater diode and a sensor diode are placed on a thermal heat sink that is the only highly conductive thermal path between the laser diode and the cold tip. The heat sink has a small volume and low thermal capacitance so that the sensing diode is at substantially the same temperature as the heater diode and substantially no thermal lag exists between them. The sensor diode is connected in a negative feedback circuit with the heater diode so that the tendency of the laser diode to thermally oscillate is virtually eliminated.

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

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N79-20283 National Aeronautics and Space Administration
Pasadena Office, Calif

**LOW COST CRYOSTAT Patent Application**

An improved cryostat for use in a low or a substantially gravity-free environment adapted to cool an experiment through the use of helium II, or helium in its super fluid state is described. The cryostat is characterized by interchangeable daughter dewars and helium supply, and a mother dewar connected to a low pressure venting system for converting helium I to a super fluid state for use as a primary cryogen. Each daughter dewar is adapted to be removably mounted in mated relation on the mother dewar and has support for an experiment package, a source of helium to be employed as a secondary cryogen, and a heat pipe 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 II progresses from the heat pipe to the experiment dewar.

A method and apparatus for preparing flat conductor cable having a plurality of ribbon-like conductors disposed upon and adhesively bonded to the surface of a substrate is described. The conductors are brought into contact with the substrate surface, and while maintained in axial tension on the substrate, the combination is seated on a yieldably compressible layer to permit the conductor to become embedded into the surface of the substrate film.

Heat leak from the surrounding atmosphere during fluid transfer from a spaced shell-insulated vessel for storing liquefied gas having an upper gaseous phase is minimized by forming a relatively wide shallow blister on the wall of the vessel at the point of transfer line connection. The shell and the opposed walls of the blister have aligned openings whose common axis passes centrally through the blister and is normal to the surfaces of the vessel and shell. A fluid transfer line conduit passing through the shell opening is in fluid-tight connection with the shell and blister wall. The fluid transfer line confines the fluid in a continuous stream. The blister is filled with a heat insulating material which provides a thermal break between the central wall portions of the blister. A connector at the bottom of the vessel comprises a tube extending between the openings in the blister which projects a short distance within the body of liquefied gas and terminates in a reverse bend to prevent backflow of liquid through the pipe.
N79-21227* National Aeronautics and Space Administration Marshall Space Flight Center Huntsville, Ala
EDGECOATINGOFFLATWIRES Patent

An apparatus and technique is described for the coating of the edge surfaces of flat ribbon conductors with an adherent coating of a dielectric insulating material Means for passing the ribbon conductors between a pair of generally axially aligned rollers is provided The edge surfaces of the conductor are disposed adjacent to and generally tangentially to the confronting surfaces of the roller so as to form a fillet of dielectric material along the edge surface of the conductor

J M S

N79-10263* National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston Tex
BITERRORRATEMEASUREMENTABOVEANDBELOWBITRATETRACKINGTHRESHOLD Patent

Bit error rate is measured by sending a pseudo-random noise (PRN) code test signal simulating digital data through digital equipment to be tested An incoming signal representing the response of the equipment being tested together with any added noise is received and tracked by being compared with a locally generated PRN code Once the locally generated PRN code matches the incoming signal a tracking lock is obtained The incoming signal is then integrated and compared bit-by-bit against the locally generated PRN code and differences between bits being compared are counted as bit errors

Official Gazette of the U S Patent Office

N79-10262* National Aeronautics and Space Administration Pasadena Office Calif
AUTOMATICCOMMUNICATIONSIGNALMONITORINGSYSTEM Patent

A system is presented for automatic monitoring of a communication signal in the RF or IF spectrum utilizing a superheterodyne receiver technique with a VCO to select and sweep the frequency band of interest A first memory is used to store one band sweep as a reference for continual comparison with subsequent band sweeps Any deviation of a subsequent band sweep by more than a predetermined tolerance level produces an alarm signal and the band sweep data temporarily stored in one of two buffer memories to be transferred to long-term store while the other buffer memory is switched to its store mode to assume the task of temporarily storing subsequent band sweeps

Official Gazette of the U S Patent Office
An FM/CW radar system is presented with improved noise discrimination in which the received signal is multiplied by a sample of the transmitted signal and the product signal is employed to deflect a laser beam as a function of frequency. The position of the beam is thus indicative of a discrete frequency and it is detected by the frequency encoded positions of an array of photodiodes. The outputs of the photodiodes are scanned, then threshold detected, and used to obtain the range and velocity of a target.

Several new and useful improvements in steering and control of phased array antennas having a small number of elements are provided. Among the improvements are increasing the number of beam steering positions, reducing the possibility of phase transients in signals received or transmitted with the antennas, and increasing control and testing capacity with respect to the antennas.

Electromagnetic wireless power transmission systems, and more particular apparatus and methods for controlling an electromagnetic transmission beam in accordance with power distribution profiles which are altered by an object entering the beam are presented. One application of the invention would be in transmitting high-power microwave energy from a spacecraft to a ground station the beam being reshaped, dimmed or doused in accordance with characteristics of objects entering the beam. The novelty of the invention lies in the use of a power profile sensing means to control an electromagnetic power beam by comparing power profiles experienced by radiation-receiving elements of the system and predetermined power profiles.
SYSTEMS AND METHODS FOR DETERMINING RADIO FREQUENCY INTERFERENCE

Klaus G. Johannsen (Hughes Aircraft Co., Los Angeles, Calif.) and Vance F. Henry (to NASA) Issued 10 Oct 1978

The presence frequency and amplitude of radio frequency interference superimposed on communication links originating from a terrestrial region and including a relay in a geostationary spacecraft are determined by pointing a narrow beam antenna on the satellite at the terrestrial region. The level of noise radiated from the region to the antenna is measured at a terrestrial station that is usually remote from the region. Calibrating radio signals having a plurality of predetermined EIRPs (Effective Isotropic Radiated Power) and frequencies in the spectrum are transmitted from the region through the spacecraft narrow beam antenna back to the station. At the station the levels of the received calibrating signals are separately measured for each of the frequency bands and EIRPs.

CONICAL SCAN TRACKING SYSTEM EMPLOYING A LARGE ANTENA

John E. Ohlson (JPL) and MacGregor S. Reid, inventors (to NASA) (JPL) Issued 24 Oct 1978

A conical scan tracking system for tracking spacecraft and distant radio sources is described. The system detects small sinusoidal modulation in received power from a source that is off target with a frequency equal to a very low scan rate, an amplitude proportional to angular deviation of the source from the target, and a phase directly related to the direction the source is off target. The sinusoid is digitally correlated with in-phase and out-of-phase scan sinusoids to obtain azimuth/elevation and hour angle/declination signals which are digitally integrated over exactly one scan period to obtain correction signals for an antenna pointing subsystem.

DIGITAL DEMODULATOR-CORRELATOR

James W. Layland (JPL) Warren L. Martin (JPL), Arthur I. Zygielbaum (JPL) Richard M. Goldstein (JPL), and William P. Hubbard (to NASA) (JPL) Issued 5 Sep 1978

An apparatus for demodulation and correlation of a code modulated 10 MHz signal is presented. The apparatus is comprised of a sample and hold analog-to-digital converter synchronized by a frequency coherent 40 MHz pulse to obtain four evenly spaced samples of each of the signal. Each sample is added or subtracted to or from the separate sums. The correlation functions are then computed. As a further feature, the invention multipliers are each multiplied by a squarewave chopper signal having a period that is long relative to the period of the received signal to foreclose contamination of the received signal by leakage from either of the other two terms of the multipliers.
AZIMUTH CORRELATOR FOR REAL-TIME SYNTHETIC
APERTURE RADAR IMAGE PROCESSING Patent
Wayne E. Arens inventor (to NASA) (JPL) Issued 2 Jan 1979
p 0180) Sponsored by NASA
Office CSCL 171

An azimuth correlator architecture is defined wherein a number
of serial range-line buffer memories are cascaded such that the
output stages of all buffer memories together form a complete
and unique range bin in the azimuthal dimension at any given
time. A range bin is automatically read out of the last stages of
the registers in parallel on a range line sample-by-sample basis
for subsequent range migration correction and correlation. Range
migration correction is performed on the range bins by effectively
varying the length of a delay register at the output of each
range-line buffer memory. The corrected range bin output from
the delay registers is then correlated with a Doppler reference
function to form an image element on a real-time basis.

N79-14276* National Aeronautics and Space Administration
Pasadena Office, Calif
DISCRIMINATOR AIDED PHASE LOOK ACQUISITION FOR
SUPPRESSED CARRIER SIGNALS Patent Application
Lansing M. Carson (JPL) and Elvin Kranen inventor (to NASA)
(JPL) Filed 15 Dec 1978 13 p Sponsored by NASA
NTIS HC A02/MF A01 CSCL 17B

Costas loops and more particularly modifications of the
Costas loop are developed in suppressed carrier receivers
employed for carrier acquisition and tracking. The novelty resides
in the control of the Q-channel low-pass filter to provide a wide
bandwidth for carrier acquisition, and in the switch control of
the loop filter for the different modes used in the successive
steps for PN search and acquisition carrier acquisition and tracking.

N79-14272* National Aeronautics and Space Administration
Pasadena Office, Calif
RADIO FREQUENCY ARRAYING METHOD FOR RECEIVERS
Patent Application
Milton H. Brockman (JPL) and Mahlon F. Easterling, inventors
(to NASA) (JPL) Filed 31 Oct 1978 29 p Sponsored by NASA
(Contract NAS7-100)
(NASA-Case-NPO-14228-1, NASA-Case-NPO-14579-1,
NTIS HC A03/MF A01 CSCL 17B

A method for arraying receiving systems is presented in
order to increase the sensitivity of a receiving facility for coherent
radio frequency reception with exemplary applications to high
rate telemetry reception, low rate telemetry reception and
radiometric tracking as well as a special application to diversity
systems using right and left circular, or vertical and horizontal
linear transmissions. The basic novelty of the invention resides
in RF carrier tracking at the first mixer of all receiving systems
slaved to one, and differential RF carrier relative to the master
A frequency translating phase conjugation circuit (PCC) for active retrodirective antenna arrays particularly for large arrays which require exact conjugation to avoid squint of the retrodirected beam is presented. The novelty resides in the PCC which yields exact frequency translation and which is free of mixer degeneracy problems. The PCC is also novel and like the PCC, is exact and free from mixer degeneracy.

A multifrequency, broadband dual-polarized corrugated conical horn antenna is simultaneously fed a multiplicity of signals, two for each of five frequencies, with each of a pair of signals fed in each of two orthogonal planes for excitation of a desired spherical hybrid mode. The lowest frequency is fed into the horn through orthogonal pairs of collinear slots, each pair being fed by a coaxial tee power divider. Other signals are fed through a circular waveguide connected to the vertex. Band reject cavities block the next higher frequency from passing through the low frequency feed slots. The highest frequency signals are fed through orthogonal ports near the far end of the circular waveguide. The intermediate frequency signals are fed through orthogonal ports spaced along the waveguide.

A synthetic multiple-look aperture radar (SAR) for spacecraft is reported. Excess azimuth bandwidth in radar echo signals is used to produce multiple-look SAR images and to provide real-time analysis of the antenna electric boresight.

A corrugated horn antenna adapted to be coupled to a waveguide at the apex for X-band excitation is further adapted to be connected to waveguides through a circumferential slot for S-band excitation at four distinct phases selected for the desired S-band polarization. The circumferential slot is positioned along the axial length of the horn for good impedance matching and is provided with an X-band choke in the form of two concentric choke slots. For further improvement in impedance matching, the outer choke slot is divided by plugs into four segments that coincide with waveguide ports for the four distinct phases of the S-band. The combiner has a low X-band of less than 0.2 dB.
ADAPTIVE POLARIZATION SEPARATION EXPERIMENTS


A broadband adaptively controlled polarization network is described in which two elliptically polarized signals are separated and crosstalk between the two signals is eliminated. The invention consists essentially of a rotatable 90 deg differential phase shifter that receives two elliptically polarized signals and makes one linear. The linear polarized signal is adjusted to vertical polarization by means of a rotatable 180 differential phase shifter. An orthomode transducer then separates the two polarized signals into their respective channels with the vertical linear polarized signal in one channel and an elliptic polarized signal in the other channel. The novel feature of this invention appears to lie in the overall combination of elements to provide a direct analog controlled dual polarization correction network.

METHOD AND APPARATUS FOR QUADRI PHASE-SHIFT KEY AND LINEAR PHASE MODULATION Patent Application


A QPSK modulator and a linear modulator are combined using separate branches out of a power divider for the two modulating functions and combining the outputs of the two branches by an up-converter in order to allow QPSK modulation at a fraction (typically one-eighth) of the transmitter frequency. The linear modulator operates at the lower frequency of the QPSK modulator with a multiplier following the linear phase modulator to increase the output of the linear phase modulator to a frequency necessary as an input to the up-converter to produce the desired transmitter output frequency. When the linear modulator is being used the QPSK modulator can be used with a PN code to spread the linear phase modulator but in either case the up-converter produce the same signal as if the QPSK modulator had been placed in series with the linear modulator but because it is in a separate branch operating at a fraction of the transmitter frequency, repeatable and precisely controlled QPSK modulator characteristics can be easily attained while in the linear modulator a significant amount of multiplication follows to maintain low modulation deviation and good linearity.

ELECTROMAGNETIC RADIATION ENERGY ARRANGEMENT Patent


A solar energy collector and infrared energy reflector is described which comprises a vacuum deposited layer of aluminum of approximately 200 to 400 Angstroms thick on one side of a substrate. An adherent layer of titanium with a thickness of between 800 and 1000 Angstroms is vacuum deposited on the aluminum substrate and is substantially opaque to solar energy and substantially transparent to infrared energy.

COAXIAL PHASED ARRAY ANTENNA Patent Application


An antenna array for communicating circularly polarized electromagnetic radiation is described. A pair of open ended antenna cavities is coaxially constructed and operates by excitation of linear radiation elements arranged within each of the cavities. A pair of crossed-dipole radiation devices is centered with the cavity and operates by means of a phase-shifting network circuit to transmit as well as receive circularly polarized radiation. Four monopole radiation devices are symmetrically arranged to operate...
in the outer cavity in phase quadrature by means of the phase-shifting network circuit to also transmit and receive circularly polarized radiation. Combined operation of the two antenna cavities with a 180° phase differential between the fields related to the two 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.

N79-19195* National Aeronautics and Space Administration Pasadena Office, Calif

MULTIBEAM SINGLE FREQUENCY SYNTHETIC APERTURE RADAR PROCESSOR FOR IMAGING SEPARATE RANGE SWATHS Patent Application
Atul Jan, inventor (to NASA) (JPL) Filed 6 Mar 1979 16 p (Contract NAS7-100)

A method and apparatus are described for single frequency multibeam imaging of multiple strips of range swath at high range intervals for those applications where it is desirable to cover a range swath much greater than is possible for a given interpulse interval. Data from a single frequency synthetic aperture radar (in which beam parameters are adjusted so that the return from each successive swath is received during successive interpulse periods) are separated in Doppler frequency for the return from each beam at the frequency plane of the processor. Alternatively, the image formed by each beam may be spatially separated in the azimuth direction and successively selected by positioning an appropriate slit in the recording plane of the processor.

SYSTEM FOR SYNCHRONIZING SYNTHESIZERS OF COMMUNICATION SYSTEMS Patent
Edward A. Enriquez, inventors (to NASA) (Hughes Aircraft Co., Los Angeles) and Ronald E. Gookin (Hughes Aircraft Co., Los Angeles) Issued 20 Feb 1979 18 p Filed 11 Apr 1977

A method and apparatus are described for single frequency multibeam imaging of multiple strips of range swath at high range intervals for those applications where it is desirable to cover a range swath much greater than is possible for a given interpulse interval. Data from a single frequency synthetic aperture radar (in which beam parameters are adjusted so that the return from each successive swath is received during successive interpulse periods) are separated in Doppler frequency for the return from each beam at the frequency plane of the processor. Alternatively, the image formed by each beam may be spatially separated in the azimuth direction and successively selected by positioning an appropriate slit in the recording plane of the processor.

N79-20297* National Aeronautics and Space Administration Lyndon B. Johnson Space Center Houston Tex

INTERACTIVE COLOR DISPLAY FOR MULTISPECTRAL IMAGERY USING CORRELATION CLUSTERING Patent
Richard E. Haskell, inventor (to NASA) (Oakland Univ., Rochester, Mich.) Issued 13 Feb 1979 12 p Filed 8 Sep 1977

A method for processing multispectral data is provided, which permits an operator to make parameter level changes during the processing of the data. The system is directed to production of a color classification map on a video display in which a given color represents a localized region in multispectral feature space. Interactive controls permit an operator to alter the size and change the location of these regions, permitting the classification of such region to be changed from a broad to a narrow classification.

N79-20298* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt Md
33 ELECTRONICS AND ELECTRICAL ENGINEERING

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

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

N79-10337* National Aeronautics and Space Administration
John F Kennedy Space Center Cocoa Beach Fla
LIGHTNING CURRENT WAVEFORM MEASURING SYSTEM
Patent
(NASA-Case-KSC-11018-1 US-Patent-4 100 487

An apparatus is described for monitoring current waveforms produced by lightning strikes which generate currents in an elongated cable. These currents are converted to voltages and to light waves for being transmitted over an optical cable to a remote location. At the remote location the waves are reconstructed back into electrical waves for being stored into a memory. The information is stored within the memory with a timing signal so that only different signals need be stored in order to reconstruct the wave form.

Official Gazette of the U S Patent Office

N79-10338* National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md
TIME DOMAIN PHASE MEASURING APPARATUS Patent
(NASA-Case-GSC-12218-1 US-Patent-4 118 665

The phase and/or period stability of a device is determined by connecting the device in one orthogonal arm of a phase detector having a mixer. In the other arm is an adjustable variable phase shift device. The output of the mixer is fed through an active low pass filter to derive a DC voltage indicative of the phase shift. The variable phase device is adjusted so that the DC voltage will nullify the phase shift of the tested device under normal conditions. The DC voltage level is converted into a time interval indicative of the phase change of the tested device by determining when the level equals the amplitude of a low frequency ramp voltage. The interval between adjacent equality points can be measured or the period between a reference point on the ramp voltage and the quality be measured.

Official Gazette of the U S Patent Office

N79-10339* National Aeronautics and Space Administration
Lewis Research Center Cleveland, Ohio
TRAVELING WAVE TUBE CIRCUIT Patent
Denis J Connolly inventor (to NASA) Issued 3 Oct 1978 4 p Filed 15 Feb 1977 Supersedes N77-17360 (115 - 08 p 1025)
(NASA-Case-LEW-12013-1 US-Patent-4 118 671

A traveling wave tube (TWT) has a slow wave structure (SWS) which is severed into two or more sections. A signal path connects the end of an SWS section to the beginning of the following SWS section. The signal path comprises an impedance matching coupler (IMC) followed by an isolator, a variable phase shifter and a second IMC. The aggregate band pass characteristic of the components in the signal path is chosen to reject or strongly attenuate all frequencies outside the desired operating frequency range of the TWT and yet pass with minimal attenuation in the forward direction all frequencies within the desired operating frequency range. The isolator is chosen to reject or strongly attenuate waves of all frequencies which propagate in the backward direction. The aggregate phase shift characteristic of the components in the signal path is chosen to apply signal power to the beginning of the following SWS section with the phase angle yielding maximum efficiency.

Official Gazette of the U S Patent Office
APPARATUS AND METHOD FOR STABILIZED PHASE DETECTION FOR BINARY SIGNAL TRACKING LOOPS

Patent

Apparatus and method is presented for phase detection in binary signal tracking loops wherein two bandpass detectors are alternately interchanged between electrical connection with two local code reference tracking signals in order to cancel any adverse effect of gain imbalance in the bandpass detectors and direct current offset or drift. The detectors are time shared in multiplex fashion between the two local reference signals.

Official Gazette of the U S Patent Office

SPACE-CHARGE LIMITED SOLID-STATE TRIODE Patent
Alex Shumka inventor (to NASA) (JPL) Issued 14 Jan 1975 7 p Filed 13 Oct 1972 Sponsored by NASA

A solid-state triode is provided from a wafer of near-intrinsic semiconductor material sliced into filaments of rectangular cross section. Before slicing emitter and collector regions are formed on the narrow sides of the filaments and after slicing gate regions are formed in arrow strips extending longitudinally along the midsections of the wide sides of the filaments. Contacts are then formed on the emitter collector and gate regions of each filament individually for a single filament device or in parallel for an array of filament devices to increase load current.

Official Gazette of the U S Patent Office

REMOTE LIGHTNING MONITOR SYSTEM Patent

An apparatus for monitoring, analyzing and accurately determining the value of peak current, the peak rate of change in current with respect to time and the rise time of the electrical currents generated in an electrical conductive mast that is located in the vicinity where lightning is to be monitored is described. The apparatus includes an electrical coil for sensing the change in current flowing through the mast and generating a voltage responsive. An on-site recorder and a recorder control system records the voltages produced responsive to lightning strikes and converts the voltage to digital signals for being transmitted back to the remote command station responsive to command signals. The recorder and the recorder control system are carried within an RFI proof environmental housing into which the command signals are fed by means of a fiber optic cable so as to minimize electrical interference.

Official Gazette of the U S Patent Office

COMPLEMENTARY DMOS-VMOS INTEGRATED CIRCUIT STRUCTURE Patent

A high speed CMOS formed on a single semiconductor substrate includes a DMOS having an asymmetric channel and a VMOS with a relatively short channel length. The short channel length of the VMOS is achieved by forming a double diffusion along one edge of a V groove or ion implanting boron into the apex of the V groove and diffusing a single layer to a relatively deep depth along both edges of the groove.
CROSS-AYERED WOVEN OR UNWOVEN YARNS ARE USED TO PROVIDE AN ACTIVE THERMAL CONTROL MECHANISM FOR SPACECRAFT USE. ONE SET OF YARNS IS COMPOSED OF FLEXIBLE ELECTRICALLY CONDUCTIVE METAL FIBERS WHICH ARE CAPABLE OF BEING RESISTANCE HEATED BY THE APPLICATION OF VOLTAGE. ANOTHER SET OF YARNS, NONCONDUCTIVE AND FLEXIBLE, PROVIDES MECHANICAL STRENGTH AND PRECLUDES THE PASSAGE OF ELECTRICAL CURRENT BETWEEN THE METAL YARNS BY VIRTUE OF THE SPACING BETWEEN THEM. A LIGHTWEIGHT ELECTRICALLY NONCONDUCTIVE FILM IS BONDED TO THE CROSS-LAYERED YARNS TO PROTECT THE METAL YARNS FROM THE ELEMENTS (MINIMIZE ELECTRICAL SHORTS FROM MOISTURE SUCH AS RAIN), TO PROVIDE ADDITIONAL STRENGTH TO THE FABRIC, AND TO PREVENT CONDUCTIVE LOSS OF HEAT IN NONVACUUM APPLICATIONS. THE NONCONDUCTIVE FILM IS METALIZED ON ITS OBLIQUE SIDE TO PROVIDE A MORE UNIFORM HEAT LOAD DISTRIBUTION.

An imaging system comprising a multichannel matrix array of charge coupled devices (CCD) is described. Sensor cells in each channel are subdivided and operated in discrete intercoupled groups or subarrays with a readout CCD shift register terminating each end of the channels. Clock voltages are applied to the subarrays and are manipulated to selectively cause charge signal flow in each subarray in either direction independent of the other subarrays. The array is divided into six independent subarrays, three on each side of the array such that each channel common to three subarrays is divided into three sections of three sensor cells each. By selective application of four phase clock voltages either one, two, or all three of the sections cause charge signal flow in one direction, while the remainder cause charge signal flow in the opposite direction. This creates a form of selective electronic exposure control which provides an effective variable time delay and integration of three, six, or nine sensor cells or integration stages.
material is positioned closely adjacent to the electrically conductive member so that the magnetic field produced by current flowing through said electrically conductive member disturbs a portion of the recorded electrical signal directly proportional to the intensity of the lightning strike.

A radio frequency glow discharge reactor is described for removing trace oxidizable contaminants from an oxygen bearing atmosphere. The reaction chamber is defined by an inner metal electrode facing a dielectric backed by an outer conductive electrode. In one embodiment a conductive liquid forms the conductor of an outer electrode and cools the dielectric. A resonator coupled to a variable radio frequency source generates the high voltages for creating a glow discharge in the chamber at a predetermined pressure whereby the trace contaminants are oxidized into a few simple non-toxic products that may be easily recovered. The corresponding process for removal of trace contaminants from an oxygen-bearing atmosphere with high efficiency independent of the concentration level is also disclosed.

A system having a time display unit remote (up to approximately 200 ft) from a master timing unit is presented. The remote display unit is characterized by its simplicity, low cost, small size, low energy requirements, reliability, and most importantly its lack of a power supply. Although the invention is applicable to the remote display of data in general, it is particularly applicable to the remote display of time of day data. Novelty is believed to exist in the transmission of the data and power signals from master timing unit to the remote display unit via a single line and to the simplicity of the circuit design employed to effect not only energization of the components at the remote unit but also to display the transmitted data.

A direct current transformer in which the primary consists of an elongated strip of superconductive material, across the ends of which is direct current potential is described. Parallel and closely spaced to the primary is positioned a transformer.

A radio frequency glow discharge reactor is described for removing trace oxidizable contaminants from an oxygen bearing atmosphere. The reaction chamber is defined by an inner metal electrode facing a dielectric backed by an outer conductive electrode. In one embodiment a conductive liquid forms the conductor of an outer electrode and cools the dielectric. A resonator coupled to a variable radio frequency source generates the high voltages for creating a glow discharge in the chamber at a predetermined pressure whereby the trace contaminants are oxidized into a few simple non-toxic products that may be easily recovered. The corresponding process for removal of trace contaminants from an oxygen-bearing atmosphere with high efficiency independent of the concentration level is also disclosed.

A system having a time display unit remote (up to approximately 200 ft) from a master timing unit is presented. The remote display unit is characterized by its simplicity, low cost, small size, low energy requirements, reliability, and most importantly its lack of a power supply. Although the invention is applicable to the remote display of data in general, it is particularly applicable to the remote display of time of day data. Novelty is believed to exist in the transmission of the data and power signals from master timing unit to the remote display unit via a single line and to the simplicity of the circuit design employed to effect not only energization of the components at the remote unit but also to display the transmitted data.

A direct current transformer in which the primary consists of an elongated strip of superconductive material, across the ends of which is direct current potential is described. Parallel and closely spaced to the primary is positioned a transformer.
A correlated quadruple sampling processor for improved signal-to-noise ratio in the output of a charge-coupled device (CCD) is comprised of (1) switching means for momentarily clamping a CCD signal line at a first reference level A before a CCD data pulse and then obtaining a first data sample B with respect to the reference A during a CCD data pulse, and storing the positive sample B-A (2) switching means for momentarily clamping the CCD signal line a second time at the level C during the presence of the CCD data pulse and then obtaining a second data sample D with respect to the reference level C after the CCD data pulse and storing the negative sample D-C and (3) means for obtaining the difference between the stored samples +(B-A) and -(D-C) thus increasing the net signal amplitude by a factor of about 2.

A method for making electrical connections to conductive thin film coatings deposited on a substrate is described. The method involves the steps of wetting a portion of the coating with an indium and metal alloy, a method which the metal has a resistivity in the range of about 1.50 to 20 microhm-cm at about 20 degrees Celsius and attaching an electrically conductive lead to the alloy. The alloy may include about 90 percent indium and about 10 percent silver or about 50 percent indium and 50 percent tin.

The development consists of a numerically controlled oscillator for and method of controlling the frequency and phase of an output signal in response to an input control word indicating an adjustment, which may be either a positive or negative adjustment to be made in the output signal. The translated input control word is then accumulated using a clock which is offset from the desired level. When the threshold is exceeded the phase and thus ultimately the frequency of the output signal is adjusted in a single direction in response to the translated control word.

N79-17135* National Aeronautics and Space Administration
Goddard Space Flight Center

A METHOD AND ALLOY FOR MAKING ELECTRICAL CONNECTIONS TO CONDUCTIVE THIN FILM Patent Application
James A. Bass and Edward M. Gaddy inventors (to NASA)
Filed 12 Jan 1979 14 p
NTIS HC A02/MF A01 CSCL 09C

A method for making electrical connections to conductive thin film coatings deposited on a substrate is described. The method involves the steps of wetting a portion of the coating with an indium and metal alloy, in which the metal has a resistivity in the range of about 1.50 to 20 microhm-cm at about 20 degrees Celsius and attaching an electrically conductive lead to the alloy. The alloy may include about 90 percent indium and about 10 percent silver or about 50 percent indium and 50 percent tin.

N79-17136 National Aeronautics and Space Administration
Lyndon B. Johnson Space Center

DIGITAL NUMERICALLY CONTROLLED OSCILLATOR Patent application
Alfred Cellier (TRW Systems Group, Redondo Beach, Calif.)
Douglas C. Huey (TRW Systems Group, Redondo Beach, Calif.)
and Lit N. Ma, inventors (to NASA) (TRW Systems Group Redondo Beach, Calif.)
29 Dec 1978 19 p
Sponsored by NASA
NTIS HC A02/MF A01 CSCL 09A

The development consists of a numerically controlled oscillator for and method of controlling the frequency and phase of an output signal in response to an input control word indicating an adjustment, which may be either a positive or negative adjustment to be made in the output signal. The translated input control word is then accumulated using a clock which is offset from the desired level. When the threshold is exceeded the phase and thus ultimately the frequency of the output signal is adjusted in a single direction in response to the translated control word.
The key simplification results from virtual addition of a bias so as to require only carries and never borrows

**N79-18193** National Aeronautics and Space Administration
John F Kennedy Space Center Cocoa Beach Fla
APPARATUS INCLUDING A PLURALITY OF SPACED TRANSFORMERS FOR LOCATING SHORT CIRCUITS IN CABLES Patent
Robert L Cason and John J McStay inventors (to NASA) Issued 29 Aug 1978 6 p Filed 8 Jul 1977 Supersedes N77-28394
(NASA-Case-KSC-10899-1 US-Patent-4 110 683

A cable fault locator is described for sensing faults such as short circuits in power cables The apparatus includes a plurality of current transformers strategically located along a cable. Trigger circuits are connected to each of the current transformers for placing a resistor in series with a resistive element responsive to an abnormally high current flowing through that portion of the cable. By measuring the voltage drop across the resistive element, the location of the fault can be determined.

Official Gazette of the U.S. Patent and Trademark Office
34 FLUID MECHANICS AND HEAT TRANSFER

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

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

34 FLUID MECHANICS AND HEAT TRANSFER

CONTROLLER FOR COMPUTER CONTROL OF BRUSHLESS DC MOTORS Patent Application

Lester S. Hieda inventor (to NASA) (JPL) Filed 23 Mar 1979 23 p

A controller for computer control of brushless DC motors was invented for brushless DC motors which provides an unusually smooth torque control arrangement. The controller provides a means for controlling a current waveform in each winding of a brushless DC motor by synchronization of an excitation pulse train from a programmable oscillator. Sensing of torque for synchronization is provided by a light beam chopper mounted on the motor rotor shaft. Speed and duty cycle are independently controlled by controlling the frequency and pulse width provided, so that current transitions from one motor winding to another is effected without abrupt changes in output torque.

STABLE SUPERCONDUCTING MAGNET Patent

Roger W. Boom inventor (to NASA) (Rockwell Intern Corp., Canoga Pk., Calif.) Issued 21 Mar 1967 5 p

Operation of a superconducting magnet is considered. A method is described for (1) obtaining a relatively high current in a superconducting magnet positioned in a bath of a gas refrigerant, (2) operating a superconducting magnet at a relatively high current level without training, and (3) operating a superconducting magnet containing a plurality of turns of a niobium zirconium wire at a relatively high current level without training.

FLUID VELOCITY MEASURING DEVICE Patent

David F. Thomas Jr. and Leon A. Williams Jr. inventors (to NASA) Issued 31 Oct 1978 9 p

A fluid velocity measuring device is described which, when placed in a freestream fluid flow, causes vortices to be formed at a frequency proportional to the flow rate of the fluid. Sensors on the device generate electric signals with frequency proportional to the rate of vortex creation and with relative mean amplitudes indicative of fluid flow direction. Electric circuitry translates the electric signals into indications of fluid speed and direction.

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

A heat exchanger, as exemplified by a rocket combustion chamber, is constructed by stacking thin metal rings having microsized openings therein at selective locations to form cooling passages defined by an inner wall, an outer wall and fins. Suitable manifolds are provided at each end of the rocket chamber. In addition to the cooling channel openings, coolant feed openings may be formed in each of rings. The coolant feed openings may be nested or positioned within generally U-shaped cooling channel openings. Compression on the stacked rings may be maintained by welds or the like or by bolts extending through the stacked rings.

Official Gazette of the U S Patent and Trademark Office

A heat exchanger of increased effectiveness is disclosed. A porous metal matrix is disposed in a metal chamber or between walls through which a heat-transfer fluid is directed. The porous metal matrix has internal bonds and is bonded to the chamber in order to remove all thermal contact resistance within the composite structure. Utilization of the invention in a rocket chamber is disclosed as a specific use. Also disclosed is a method of constructing the heat exchanger.

Official Gazette of the U S Patent and Trademark Office

Method and Turbine for Extracting Kinetic Energy from a Stream of Two-Phase Fluid Patent


An axial flow separator turbine is described which includes a number of nozzles for delivering streams of a two-phase fluid along linear paths. A phase separator which separately separates the vapor and liquid is characterized by concentrically related annuli supported for rotation within the paths. The separator has endless channels for confining the liquid under the influence of centrifugal forces. A vapor turbine fan extracts kinetic energy from the liquid. Angular momentum of both the liquid phase and the vapor phase of the fluid is converted to torque.

Official Gazette of the U S Patent and Trademark Office

Closed Loop Spray Cooling Apparatus Patent

A closed loop apparatus for jet spraying coolant against the back of a radiation target is described. The coolant is circulated through a closed loop with a bubble of inert gas being maintained around the spray. Mesh material is disposed between the bubble and the surface of the liquid coolant which is below the bubble at a predetermined level. In a second arrangement no inert gas is used. The bubble consists of vapor produced when the coolant is sprayed against the target.

Official Gazette of the U S Patent and Trademark Office
A HEAT EXCHANGER AND METHOD OF MAKING Patent Application
A Fortmi and John M Kazaroff, inventors (to NASA) Filed 30 Nov 1977 14 p

A heat exchanger of increased effectiveness is described. A porous metal matrix is disposed in a metal chamber or between walls through which a heat-transfer fluid is directed. The porous metal matrix has internal bonds and is bonded to the chamber in order to remove all thermal contact resistance within the composite structure. A specific use is to provide a method of making a rocket chamber with maximum heat transfer at the throat area where inner wall temperatures are the highest.

A pseudo continuous wave instrument Patent

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

METHOD OF OBTAINING INTENSIFIED IMAGE FROM DEVELOPED PHOTOGRAPHIC FILMS AND PLATES Patent
Barbara S Askins inventor (to NASA) Issued 18 Jul 1978 8 p Filed 9 Jun 1976 Supersedes N76-26449 (14 - 17 p 2189)

A method is explained of obtaining intensified images from silver images on developed photographic films and plates. The steps involve converting silver of the developed film or plate to a radioactive compound by treatment with an aqueous alkaline solution of an organo-S35 compound, placing the treated film or plate in direct contact with a receiver film which is then exposed by radiation from the activated film and developing and fixing the resulting intensified image on the receiver film.

A surface roughness measuring system Patent
Atul Jam inventor (to NASA (JPL)) Issued 18 Jul 1978 15 p Filed 24 Nov 1976 Supersedes N77-17255 (15 - 08 p 1020)
(Sponsored by NASA)

Significant height information of ocean waves or peaks of rough terrain is obtained by compressing the radar signal over different widths of the available chirp or Doppler bandwidths and cross-correlating one of these images with each of the others. Upon plotting a fixed (e.g. zero) component of the cross-correlation values as the spacing is increased over some empirically determined range the system is calibrated. To measure height with the system a spacing value is selected and a cross-correlation value is determined between two intensity images at a selected frequency spacing. The measured height is the slope of the cross-correlation value used. Both electronic and optical radar
signal data compressors and cross-correlations are disclosed for implementation of the system

Official Gazette of the U S Patent Office

A cylindrically shaped enclosure has a source of alpha particles at one end and detectors mounted in tandem at the other end. Two downward-extendt baffle and a blocking shield define a forward-scattering angular range in which scattering products from alpha particle/hydrogen and alpha particle/helium collisions can reach the detector's surface. The thickness of the detectors is sized so that alpha particles resulting from alpha particle helium collisions are absorbed in the first detector and recoil protons resulting from alpha particles/hydrogen collisions pass through the first detector and are absorbed by the second detector. Each scattering product is identified from its ability to penetrate or not penetrate a detection material of predetermined thickness. The output pulses are processed by an electronic processing system. The apparatus could be carried by a planetary probe to one of the outer planets.

NASA
N79-14346  National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio
THERMOCOUPLES OF MOLYBDENUM AND IRIDIUM
ALLOYS FOR MORE STABLE VACUUM-HIGH TEMPERA-
TURE PERFORMANCE Patent
James F. Morris, inventor (to NASA) Issued 5 Sep 1978 5 p
Filed 21 Nov 1977 Continuation-in-part of abandoned US Patent
Appl SN-667929, filed 18 Mar 1977
(NASA-Case-LEW-12174-2, US-Patent-4,111,718,
US Patent and Trademark Office CSCL 14B
Thermocouples providing stability and performance reliability
in systems involving high temperatures and vacuums by employing
a bimetallic thermocouple sensor are described. Each metal of
the sensor is selected from a group of metals comprising
molybdenum and indium and alloys containing only those two
metals. The molybdenum, indium thermocouple sensor alloys
provide bare metal thermocouple sensors having advantageous
vapor pressure compatibility and performance characteristics.
The compatibility and physical characteristics of the thermocouple
sensor alloys result in improved emf, temperature properties and
thermocouple hot junction performance.
Official Gazette of the U.S. Patent and Trademark Office

N79-14347  National Aeronautics and Space Administration
Langley Research Center, Hampton, Va.
ELECTRONICALLY SCANNED PRESSURE SENSOR MOD-
ULE WITH IN SITU CALIBRATION CAPABILITY Patent
Chris Gross, inventor (to NASA) Issued 5 Sep 1978 10 p
Filed 6 Jun 1977 Supersedes N77-28395 (15 - 19
Continuation of abandoned US Patent Appl
SN-565162, filed 4 Apr 1975 Sponsored by NASA
(NASA-Case-NPO-13569-2, US-Patent-4,132,940,
Office CSCL 14B
Analog voltage approximately linearly proportional to a
desired offset from the present null position of a moving mirror
in an interferometer is applied to the mirror moving means. As
the mirror moves to the next null position as determined by
the analog voltage, the fringes of a laser reference interference
pattern are detected. At the occurrence of each fringe the analog
voltage is reduced proportionally so that when the next null
position is reached, the driving analog is effectively zero. A
binary up/down counter by its internal count causes a
digital/analog converter to supply the analog voltage to the mirror
moving means. Fringe detection and direction of movement logic
cause the binary up/down counter to be decremented from its
current count as the mirror is moved to the new null position.
Undesirable movement of the mirror due to vibration or other
sources causes a correcting drive signal to be applied to the
mirror moving means that is proportional to the distance of
movement. Official Gazette of the U.S. Patent and Trademark Office

N79-14348 National Aeronautics and Space Administration
Pasadena Office, Calif.
APPARATUS FOR PROVIDING A SERVO DRIVE SIGNAL
IN A HIGH-SPEED STEPPING INTERFEROMETER Patent
Rudolf A. Schmidler, inventor (to NASA) (JPL) Issued 2 Jan
1979 12 p Filed 6 Jun 1977 Supersedes N77-28395 (15 -
Continuation of abandoned US Patent Appl
SN-565162, filed 4 Apr 1975 Sponsored by NASA
(NASA-Case-NPO-13569-2, US-Patent-4,132,940,
Office CSCL 14B
An analog voltage approximately linearly proportional to a
desired offset from the present null position of a moving mirror
in an interferometer is applied to the mirror moving means. As
the mirror moves to the next null position as determined by
the analog voltage, the fringes of a laser reference interference
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binary up/down counter by its internal count causes a
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cause the binary up/down counter to be decremented from its
current count as the mirror is moved to the new null position.
Undesirable movement of the mirror due to vibration or other
sources causes a correcting drive signal to be applied to the
mirror moving means that is proportional to the distance of
movement. Official Gazette of the U.S. Patent and Trademark Office

wind tunnel models thus eliminating long tube lengths and their
Corresponding slow pressure response
Official Gazette of the U.S. Patent and Trademark Office
VERSATILE LDV BURST SIMULATOR Patent
Otto Youngbluth, Jr inventor (to NASA) Issued 19 Dec 1979
7 p Filed 16 Dec 1977 Supersedes N78-17367 (16 - 08, p 1022)
US Patent and Trademark Office CSCL 14B

A device for generating burst signals is reported that can be used to determine whether or not a laser Doppler velocimeter is operating properly. A high frequency signal which corresponds to the information frequency of the laser Doppler velocimeter is modulated by a low frequency signal to provide an envelope for the high frequency signal. The high frequency signal is modulated by any modulator means such as, for example, an analog multiplier. The low frequency signal is added to the modulated signal to provide pedestals for the resulting series of burst pulses. The means are provided for selecting different combinations of these burst signals. Also means are provided for making the burst signals asymmetrical as desired in addition, means are provided for varying the frequencies, and amplitudes of the information, envelope and pedestal frequency signals in the burst signals.

N79-16246* National Aeronautics and Space Administration
Pasadena Office, Calif
THERMOMAGNETIC RECORDING AND MAGNETIC-OPTIC PLAYBACK SYSTEM Patent
George W Lewicki (JPL) and John E Gamsinger, inventors (to NASA) (JPL) Issued 7 Dec 1971 5 p Filed 10 Mar 1969
Sponsored by NASA
(NASA-Case-NPO-10872-1 Us-Patent-3 626,114

A magnetic recording and magneto-optic playback system is disclosed wherein thermomagnetic recording is employed. A transparent isotropic film is heated along a continuous path by a focused laser beam. As each successive area of the path is heated locally to the vicinity of its Curie point in the presence of an applied magnetic field, a magneto-optic density is established proportional to the magnetic field and fixed in place as the area cools once the laser beam moves on to an adjacent area. To play back the recorded data, the intensity of the laser beam is reduced to avoid reaching the vicinity of the Curie point of the film as it is scanned by the laser beam in the same manner as for recording. A Faraday effect analyzer and photo detector are employed as a transducer for producing an output signal.
A cooled echelle grating spectrometer for detecting wavelengths between one micron and fifteen microns is described. More specifically, a spectrometer is disclosed, having a cross-dispersing grating for ordering infrared energy, and an echelle grating for further ordering of the infrared energy. Means are also disclosed to direct infrared energy to the cross-dispersing grating and then to the echelle grating. Ordered radiation from the echelle grating is sensed by a detecting means. Means are also provided for cooling the cross-dispersing grating, the echelle grating, and the detecting means so that background radiation can be minimized. In a specific embodiment the cross-dispersing grating and echelle grating are in separate enclosed volumes having access to each other through a single intermediate aperture, reflected energy from the cross-dispersing grating being focused so as to pass through the intermediate aperture.

An interferometer is presented to measure slight differences in path length of two beams and to enable comparison of the spectrum of an unknown light source with a known source. One novel feature is the use of largely plate-like elements to form a beamsplitter, and with reflector surfaces at the edges of the elements to provide tilt compensation. Another feature is that the outer surfaces of the plate-like elements are angled from parallelism with the beamsplitter interface, to avoid the effects from ghost reflections. Another feature is the separation of the elements by a thin oil film to permit sliding of one plate relative to the other.
35 INSTRUMENTATION AND PHOTOGRAPHY

N79-19319*# National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex

METHOD FOR APPLYING PHOTOGRAPHIC RESISTS TO OTHERWISE INCOMPATIBLE SUBSTRATES Patent
Application

An improved method for applying photographic resists to otherwise incompatible substrates, such as a baking enamel paint surface, is described. The incurred enamel paint surface is coated with noncuring lacquer which in turn, coated with a partially cured lacquer. The noncuring lacquer adheres to the enamel and a photo resist material will satisfactorily adhere to the partially cured lacquer. Once normal photo etching techniques are employed the lacquer coats are easily removed from the enamel leaving the photo etched image. This invention is particularly applicable to preparation of edge lighted instrument panels. A coat of uncured enamel is placed over the cured enamel followed by the lacquer coats and the photo resists, which are exposed and developed in the normal way. Once the uncured enamel is cured, the lacquer coats are removed leaving an etched panel. NASA

36 LASERS AND MASERS
Includes parametric amplifiers

N79-14382* National Aeronautics and Space Administration
Godard Space Flight Center Greenbelt, Md

EXTERNAL BULB VARIABLE VOLUME MASER Patent

A maser functioning as a frequency standard stable to one part in 10 to the 14th power includes a variable volume, constant surface area storage bulb having a fixed volume portion located in a resonant cavity from which the frequency standard is derived. A variable volume portion of the bulb, exterior to the resonant cavity, has a maximum volume on the same order of magnitude as the fixed volume bulb portion. The cavity has a length to radius ratio of at least 3 so that the operation is attained without the need for a feedback loop. A baffle plate, between the fixed and variable volume bulb portions includes apertures for enabling hydrogen atoms to pass between the two bulb portions and is an electromagnetic shield that prevents coupling of the electromagnetic field of the cavity into the variable volume bulb portion. NASA

N79-18307* National Aeronautics and Space Administration
Langley Research Center Hampton Va

VOLUMETRIC DIRECT NUCLEAR PUMPED LASER

A volumetric direct nuclear pumped laser was developed in which the gas is a mixture of He-3 and a minority gas from the group of argon, krypton, xenon, chlorine, and fluorine. The mixture of He-3 and the minority gas produces lasing with a minority gas concentration of from 0.01 to 10 percent argon, 0.01 to 5 percent xenon, and small concentrations of chlorine or fluorine. Official Gazette of the U.S. Patent and Trademark Office

N79-21333* National Aeronautics and Space Administration
Marshall Space Flight Center Huntsville, Ala

GAS ION LASER CONSTRUCTION FOR ELECTRICALLY ISOLATING THE PRESSURE GAUGE THEREOF Patent

A gas ion laser with a pressure gauge and a gas pressure reservoir connected to the laser through a valve is described. The valve and the pressure gauge are electrically insulated from the laser discharge path by connecting them in series with the cathode of the laser. The cold cathode is provided with a central aperture to which is connected both the pressure gauge and the gas pressure reservoir through the valve. This effectively prevents electric discharges from passing either to the pressure gauge or the valve which would otherwise destroy the pressure gauge. Official Gazette of the U.S. Patent and Trademark Office
A pulse forming network for compressing the width and sharpening the rise time of high voltage pulses from relatively slow rise time generators is discussed. The network also provides impedance matching from a high impedance source to a low impedance load for the purpose of efficient energy transfer. Cascaded saturable inductor switches are provided for pulse width compression so that output pulses having rise times of less than one hundred nanoseconds can be obtained. The pulse rise times were determined by the thickness of a high permeability material forming the saturable inductor switch. A means for magnetically biasing the saturable inductor switch so that only pulses from a pulse generator having one polarity are passed and pulses having the opposite polarity are blocked is presented.

A gas-lubricated bearing is described employing at least one pad mounted on a rectangular cantilever beam to produce a lubricating wedge between the face of the pad and a moving surface. The load-carrying and stiffness characteristics of the pad are related to the dimensions and modulus of elasticity of the beam. The bearing is applicable to a wide variety of types of hydrodynamic bearings. Official Gazette of the U.S. Patent Office.
An improved vehicular impact absorption system characterized by a plurality of aligned crash cushions of substantially cubic configuration is described. Each consists of a plurality of voided aluminum beverage cans arranged in substantial parallelism within a plurality of superimposed tiers and a covering envelope formed of metal hardware cloth. A plurality of cables is extended through the cushions in substantial parallelism with an axis of alignment for the cushions adapted to be anchored at each of the opposite end thereof.

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**N79-10421**

**COMPUTERIZED SYSTEM FOR TRANSLATING A TORCH HEAD Patent**


The system provides a constant travel speed along a contoured workpiece. It has a driven skate characterized by an elongated bed with a pair of independently pivoted trucks connected to the bed for support. The trucks are mounted on a contoured track of arbitrary configuration in a mutually spaced relation. An axially extensible torch head manipulator arm is mounted on the bed of the carriage and projects perpendicular from the midportion. The torch head is mounted at its distal end. A real-time computerized control drive subsystem is used to advance the skate along the track of a variable rate for maintaining a constant speed for the torch head tip and to position the torch axis relative to a preset angle to the workpiece.

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**N79-10426**

**FREE-PISTON REGENERATIVE HOT GAS HYDRAULIC ENGINE Patent Application**

Donald G. Beremand, inventor (to NASA) Filed 12 Oct 1978

21 p


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

**N79-10427**

**A QUARTZ BALL VALUE Patent Application**


A ball value is described particularly suited for use in the handling of highly corrosive fluids. This item is characterized by (1) a valve housing formed of communicating segments of quartz tubing (2) a pair of communicating sockets disposed in coaxial alignment with selected segments of tubing for establishing a pair of inlet ports (3) a ball formed of quartz material supported for displacement between the sockets and (4) a valve actuator with a rod attached to the ball for selectively displacing the ball relative to each of the sockets for controlling fluid flow through the inlet ports.

**N79-11402**

**POSITIVE ISOLATION DISCONNECT Patent**


A disconnect composed basically of two halves each consisting of a poppet valve operable to isolate fluid with essentially zero fluid loss is presented. The two halves are coupled together by a quickly releasable coupling which may be either a coupling ring tightened or loosened by a twisting motion or a clamp operated by a pivoted to prevent disconnecting the two halves until both valves are in closed condition. The positive feature of the device is one requiring a valve closing step before a disconnect step and takes structural form in an eccentric lobe mounted on the valve operating stem. If some obstruction prevents the poppet from moving to its seat the eccentric lobe cannot be rotated to the closed position and the interlock prevents a disconnect.

Official Gazette of the U.S. Patent Office
means and further operative in a second mode for bypassing the second fluid around the second heat exchanger means.

Official Gazette of the U.S. Patent Office

**N79-11405** National Aeronautics and Space Administration Pasadena Office Calif

**PLASMA IGNITER FOR INTERNAL COMBUSTION ENGINE Patent**


An igniter for the air/fuel mixture used in the cylinders of an internal combustion engine is described. A conventional spark is used to initiate the discharge of a large amount of energy stored in a capacitor. A high current discharge of the energy in the capacitor switched on by a spark discharge produces a plasma and a magnetic field. The resultant combined electromagnetic current and magnetic field force accelerates the plasma deep into the combustion chamber thereby providing an improved ignition of the air/fuel mixture in the chamber.

Official Gazette of the U.S. Patent Office

**N79-1404** National Aeronautics and Space Administration Marshall Space Flight Center Huntsville Ala

**SPHERICAL BEARING Patent**


A spherical bearing including an inner ball with an opening for receiving a shaft and a spherical outer surface is described. Features of the bearing include (1) a circular outer race including a plurality of circumferentially spaced sections extending around the inner ball for snugly receiving the inner ball and (2) a groove extending circumferentially around the race producing a thin wall portion which permits the opposed side portions to flex relative to the ball for maximizing the physical contact between the inner surface of the race and the spherical outer surface of the ball.

Official Gazette of the U.S. Patent Office

**N79-12445** National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio

**SELF-STABILIZING RADIAL FACE SEAL Patent Application**


A self-stabilizing radial face seal is reported that consists of a primary seal ring juxtapositioned to a seal seat. The seal seat is provided with a porous ring-like circumferential structure which allows for the fluid pressure in the system to reach equilibrium. A cavity behind the porous ring provides a constant pressure reservoir.

NASA
AN IMPROVED SUSPENSION SYSTEM FOR A WHEEL ROLLING ON A FLAT TRACK Patent Application
Houston D McGinness inventor (to NASA) (JPL) Filed 17 Nov 1978 25 p
A suspension system is described which has particular utility as an azimuth bearing for large track-mounted antennas The system comprises a wheel frame assembly including at least one uncrowned wheel connected in supporting relation with the assembly and adapted to be seated in rolling engagement with a flat truck a load supporting bed, and a number of flexural struts interconnecting the bed and the assembly. Each of the struts is disposed in an inclined plane passing through the center of the uncrowned wheel surface along the line substantially bisecting the line of contact established between the wheel surface and the track surface and is characterized by a modulus of elasticity sufficient for maintaining the axis of rotation for the wheel in substantial parallelism with the line of contact NASA

TOTALLY CONFINED EXPLOSIVE WELDING Patent
The undesirable by-products of explosive welding are confined and the association noise is reduced by the use of a simple enclosure into which the explosive is placed and in which the explosion occurs. An infrangible enclosure is removably attached to one of the members to be bonded at the point directly opposite the bond area. An explosive is completely confined within the enclosure at a point in close proximity to the member to be bonded and a detonating means is attached to the explosive. The balance of the enclosure, not occupied by explosive is filled with a shaped material which directs the explosive pressure toward the bond area. A detonator adaptor controls the expansion of the enclosure by the explosive force so that the enclosure at no point experiences a discontinuity in expansion which causes rupture. The use of the technique is practical in the restricted area of a space station Official Gazette of the U.S. Patent and Trademark Office

LOCKING REDUNDANT LINK Patent
A low-friction axially extensible strut automatically lockable in both tension and compression for use as a secondary load path in helicopter main rotor force measurement systems is described Official Gazette of the U.S. Patent and Trademark Office

HIGH-TORQUE OPEN-END WRENCH Patent
A wrench is described that is usable where limited access normally requires an open-end wrench but which has substantially the high-torque capacity and small radial clearance characteristics of a closed-end wrench. The wrench includes a sleeve forming a nut-engageable socket with a gap in its side, and an adaptor forming a socket with a gap in its side the adaptor closely surrounding the sleeve and extending across the gap in the sleeve. The sleeve and adaptor have surfaces that become fully engaged when a wrench handle is applied to the adaptor to turn it so as to tighten a nut engaged by the sleeve Official Gazette of the U.S. Patent and Trademark Office
FLUIDIZED BED COAL COMBUSTION REACTOR Patent Application
Philip I. Moynihan (JPL) and Donald L. Young, inventors (to NASA) (JPL) Filed 15 Dec 1978 13 p
(Contract NAS7-100)

A fluidized bed coal reactor which includes a combination nozzle-injector ash-removal unit formed by a grid of closely spaced open channels, each containing a worm screw conveyor, which function as continuous ash removal troughs is presented. A pressurized air-coal mixture is introduced below the unit and is injected through the elongated nozzles formed by the spaces between the channels. The ash build-up in the troughs protects the worm screw conveyors as does the cooling action of the injected mixture. The ash layer and the pressure from the injectors support a fluidized flame holder combustion zone above the grid which heats water in boiler tubes disposed within and/or above the combustion zone and/or within the walls of the reactor.

A PHASE-ANGLE CONTROLLER FOR STIRLING ENGINES Patent Application
Allan R. McDougal, inventor (to NASA) (JPL) Filed 31 Jan 1979 10 p
(Contract NAS7-100)

Actuators used to control the phase relation between the expander and displacer portions of the engine are proposed. The actuators employ variations in torque requirements of a Stirling engine occurring during each cycle and function as a hydraulic ratchet, whereby minimal external forces are required for varying phase-angle relations between the crankshafts for expander and displacer portions of the engine.
N79-17225 National Aeronautics and Space Administration
Lyndon B Johnson Space Center Houston Tex
THERMAL BARRIER PRESSURE SEAL Patent Application
John Bellavia, Jr (Rockwell Intern Downey Calif) and John O Kane inventors (to NASA) (Rockwell Intern Downey Calif) Filed 29 Dec 1978 16 p Sponsored by NASA
(NASA-Case-MSC-18134-1 US-Patent-App-SN-974472) Avail NTIS HC A02/MF A01 CSCL 11A
The seal of the present invention is one which performs the dual function of providing a pressure seal and a thermal barrier in a variable space for the extreme pressure and heat conditions encountered for example, in space flight. The seal features the ability to roll, compress and expand to maintain a pressure-tight thermal seal for preventing entry of hot gases into spaces between adjacent members of the spacecraft.

N79-19364 National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md
A COUPLING DEVICE FOR MOVING VEHICLES Patent Application
Arthur A Rudmann inventor (to NASA) 6 Feb 1979 23 p
A device is presented for attachment to the arm of a remote manipulator system carried by a first space vehicle for grasping, aligning and firmly coupling with a payload in the form of a satellite or other object which is in substantial misalignment and/or rotating with respect to the coupling device. The coupling device is characterized by its simplicity, light-weight, small size, low cost and most importantly its reliability. Although the device was designed primarily for use in coupling space vehicles, smaller versions of the device can conceivably be used on the end of any remote type manipulator arm such as for example those used in handling radioactive materials or in undersea exploration.

N79-20377 National Aeronautics and Space Administration
Lyndon B Johnson Space Center Houston Tex
SEQUENCING DEVICE UTILIZING PLANETARY GEAR SET Patent
Walter T Appleberry inventor (to NASA) (Rockwell International Downey Calif) Issued 27 Feb 1979 7 p Filed 25 Feb 1977 Supersedes N77-19459 (15-10 p 1319) Sponsored by NASA
A planetary (epicyclic) gear set is provided with a reversible rotating input shaft and individual output shafts actuated respectively by the ring gear and planet gear carrier. Latch means is positioned to selectively and automatically stop the ring gear or carrier member while releasing the other to provide the desired sequential output operation. The output shafts are reversed in sequence and direction of rotation by reversing rotational direction of the input shaft.

N79-20377* National Aeronautics and Space Administration
Lewis Research Center Cleveland Ohio
COMPOSITE SEAL FOR TURBOMACHINERY Patent
A gas path seal suitable for use with a turbine engine or compressor is provided. A shroud wearable or abradable by the abrasion of the rotor blades of the turbine or compressor protects the rotor blades. A compliant backing surrounds the shroud. The backing may be made of corrugated sheets or the like with adjacent layers having off-set corrugations, with axes of the folds parallel to the rotor axis. The sheets may be bonded together at points of contact by brazing, welding or the like. In another embodiment a compliant material is covered with a thin ductile layer. A mounting fixture surrounds the backing.

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

N79-19364* National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md
A COUPLING DEVICE FOR MOVING VEHICLES Patent Application
Arthur A Rudmann inventor (to NASA) 6 Feb 1979 23 p
A device is presented for attachment to the arm of a remote manipulator system carried by a first space vehicle for grasping, aligning and firmly coupling with a payload in the form of a satellite or other object which is in substantial misalignment and/or rotating with respect to the coupling device. The coupling device is characterized by its simplicity, light-weight, small size, low cost and most importantly its reliability. Although the device was designed primarily for use in coupling space vehicles, smaller versions of the device can conceivably be used on the end of any remote type manipulator arm such as for example those used in handling radioactive materials or in undersea exploration.

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

Official Gazette of the U.S. Patent and Trademark Office
37 MECHANICAL ENGINEERING

N79-21346* National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex
WATER SEPARATOR Patent
An apparatus for separating liquids from gases or gaseous fluids is described. Features of the apparatus include (1) the collection and removal of the moisture in the fluid is not dependent upon or affected by gravity, (2) all the collected water is cyclically drained from the apparatus irrespective of the attitude of the separator and (3) a fluid actuator is utilized to remove the collected water from the separator J M S

38 QUALITY ASSURANCE AND RELIABILITY
Includes product sampling procedures and techniques and quality control

N79-14398* National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex
LENGTH MODE PIEZOELECTRIC ULTRASONIC TRANS- DUCER FOR INSPECTION OF SOLID OBJECTS Patent
The transducer is constructed from individual transducer elements arranged in an array and configured to exhibit a predominant, longitudinal mode transversely to the array. The elements are interconnected through thin flexible sheets. Each element is individually damped, and the transducer as a whole is electrically damped through resonance with the clamped capacitance and dissipation. Electrical control permits inphase operation of all transducer elements or control with preselected phase differences. Official Gazette of the US Patent and Trademark Office

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

N79-17288* National Aeronautics and Space Administration
Pasadena Office, Calif.
MULTISPECTRAL IMAGING AND ANALYSIS SYSTEM Patent
Arrays of charge coupled devices or linear detector arrays simultaneously obtain spectral reflectance data of different wavelengths for a target area. Several accommodating a particular bandwidth are individually associated with each array. Data from the arrays are read out in parallel and applied to a computer or microprocessor for processing. The microprocessor serves to analyze the data in real time and if possible in accordance with hard-wired algorithms. The data are then displayed as an image on an appropriate display unit and also recorded for further use. The display system may be operationally connected to receive a terrain image such that the target area and the analyzed spectral reflectance data are superimposed and simultaneously displayed. Official Gazette of the US Patent and Trademark Office
**44 ENERGY PRODUCTION AND CONVERSION**

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

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

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**44 ENERGY PRODUCTION AND CONVERSION**

the cover plate until incident upon the active surface of the solar cell occurs.

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**N79-10513** National Aeronautics and Space Administration Pasadena Office Calif

**DUAL MEMBRANE HOLLOW FIBER FUEL CELL AND METHOD OF OPERATING SAME Patent**


A gaseous fuel cell is described which includes a pair of electrodes formed by open-ended ion-exchange hollow fibers each having a layer of metal catalyst deposited on the inner surface and large surface area current collectors such as braided metal mesh in contact with the metal catalyst layer. A fuel cell results when the electrodes are immersed in electrolytes and electrically connected. As hydrogen and oxygen flow through the bore of the fibers, oxidation and reduction reactions develop an electrical potential. Since the hollow fiber configuration provides large electrode area per unit volume and intimate contact between fuel and oxidizer at the interface and due to the low internal resistance of the electrolyte, high power densities can be obtained.

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**N79-10529** National Aeronautics and Space Administration Pasadena Office Calif

**AN IMPROVED SOLAR CELL MODULE Patent Application**


A concentrator for a solar cell module with the capability of achieving significant concentration of incident flux without resorting to the use of ancillary concentration devices is described. A heterojunction or Schottky barrier photovoltaic device is described comprising a conductive base metal layer. A back surface field region was formed at the interface between the device and the base metal layer. A transparent conductive mixed metal oxide layer in integral contact with the n-type layer of the heterojunction or Schottky barrier device. A metal alloy grid network was included. An insulating layer prevented electrical contact between the conductive metal base layer and the transparent conductive metal oxide layer.

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**N79-11467** National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio

**SOLAR CELLS HAVING INTEGRAL COLLECTOR GRIDS Patent**


A heterojunction or Schottky barrier photovoltaic device is described comprising a conductive base metal layer. A back surface field region was formed at the interface between the device and the base metal layer. A transparent conductive mixed metal oxide layer in integral contact with the n-type layer of the heterojunction or Schottky barrier device. A metal alloy grid network was included. An insulating layer prevented electrical contact between the conductive metal base layer and the transparent conductive metal oxide layer.

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**N79-11468** National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio

**APPLICATION OF SEMICONDUCTOR DIFFUSANTS TO SOLAR CELLS BY SCREEN PRINTING Patent**

A method for making these panels is disclosed.

A solar energy collector system is described characterized by an improved concentrator for directing incident rays of solar energy on parallel strip-like segments of a flatplate receiver individually mounted reflector modules of a common asymmetrical triangular cross-sectional configuration supported for independent orientation are asymmetrically included with vee-trough concentrators for deflecting incident solar energy toward the receiver.

A transparent conductive collector layer containing conductive metal channels is formed as a layer on a photovoltaic substrate by coating a photovoltaic substrate with a conductive mixed metal layer. A heat sink having portions protruding from one of its surfaces is attached. These protruding portions define a continuous pattern in combination with recessed regions among them such that they are in contact with the conductive layer of the photovoltaic substrate. Heating the substrate while simultaneously oxidizing the portions of the conductive layer exposed to a gaseous oxidizing substance forced into the recessed regions of the heat sink creates a transparent metal oxide layer on the substrate. A continuous pattern of highly conductive metal channels is contained in the metal oxide layer.
44 ENERGY PRODUCTION AND CONVERSION

METHOD AND APPARATUS FOR MEASURING MINORITY CARRIER LIFETIMES AND BULK DIFFUSION LENGTH IN P-N JUNCTION SOLAR CELLS

Oldwig von Roos, inventor
Patent
Issued 24 Oct 1978
8 p
Filed 16 Dec 1977
Sponsored by NASA

Carrier lifetimes and bulk diffusion length are qualitatively measured as a means for qualification of a P-N junction photovoltaic solar cell. High frequency (blue) monochromatic light pulses and low-frequency (red) monochromatic light pulses were alternately applied to the cell while it was irradiated by light from a solar simulator, and synchronously displaying the derivative of the output voltage of the cell on an oscilloscope. The output voltage is a measure of the lifetimes of the minority carriers (holes) in the diffused N layer and majority carriers (electrons) in the bulk P material, and of the diffusion length of the bulk silicon. By connecting a reference cell in this manner with a test cell to be tested in reverse parallel, the display of a test cell that matches the reference cell will be a substantially zero output.

SAFETY FLYWHEEL

Richard T Schneider, inventor
Patent
Issued 2 Jan 1979
4 p
Filed 17 Jan 1977
Sponsored by NASA

An inertial energy storage device is disclosed which uses a flywheel made of flexible material such as a twisted rope ring. A small number of the strands of the rope ring have a tensile strength that is lower than that of most of the other strands, so that should any of these strands fail, they will begin to whip lash, allowing such a failure to be detected and braked before a catastrophic failure occurs. This is accomplished by the inclusion of glass tubes located around the periphery of the flywheel. The tubes are in communication with a braking fluid reservoir. The flywheel and glass tubes are enclosed within a vacuum-tight housing. The whipping of a broken strand breaks one or more glass tubes, which causes the housing to be flooded with the braking fluid thereby braking the rotation of the flywheel.

SUN TRACKING SOLAR ENERGY COLLECTOR

Gerald S Perkins, inventor
Patent
Issued 5 Sep 1978
6 p
Filed 6 Apr 1977
Sponsored by NASA

A parabolic reflector is supported so that it can track the sun. The support for this reflector comprises an azimuth frame supported on two wheels and a central pivot point which are positioned in a substantially triangular configuration. On top of the azimuth frame, there is provided an elevation frame. The reflector rides on wheels captured within curved rails. The wheels of the azimuth frame are driven by an azimuth actuator. The reflector structure is counterbalanced about its elevation axis by a pendulum cable system which is driven by a motor. At the focal point of the parabolic reflector, a heat engine or receiver is mounted independently on the reflector. Suitable means are provided for moving the reflector about its two axes.

BACK WALL SOLAR CELL

Henry W Brandhorst, Jr., inventor
Patent
Issued 26 Dec 1978
5 p
Filed 24 Apr 1978
Sponsored by NASA

A parabolic reflector is supported so that it can track the sun. The support for this reflector comprises an azimuth frame supported on two wheels and a central pivot point which are positioned in a substantially triangular configuration. On top of the azimuth frame, there is provided an elevation frame. The reflector rides on wheels captured within curved rails. The wheels of the azimuth frame are driven by an azimuth actuator. The reflector structure is counterbalanced about its elevation axis by a pendulum cable system which is driven by a motor. At the focal point of the parabolic reflector, a heat engine or receiver is mounted independently on the reflector. Suitable means are provided for moving the reflector about its two axes.
44 ENERGY PRODUCTION AND CONVERSION

A solar cell is disclosed which comprises a first semiconductor material of one conductivity type with one face having the same conductivity type but more heavily doped to form a field region arranged to receive the radiant energy to be converted to electrical energy, and a layer of a second semiconductor material preferably highly doped of opposite conductivity type on the first semiconductor material adjacent the first semiconductor material at an interface remote from the heavily doped field region. In the place of the opposite conductivity layer, a metallic Schottky diode layer may be used in which case no additional back contact is needed. A contact such as a gridded contact previous to the radiant energy may be applied to the heavily doped field region of the more heavily doped, same conductivity material for its contact.

N79-14529* National Aeronautics and Space Administration
Pasadena Office, Calif
PRIMARY REFLECTOR FOR SOLAR ENERGY COLLECTION SYSTEMS Patent

A fixed, linear ground-based primary reflector is disclosed which has an extended curved sawtooth-contoured surface covered with a metalized polymeric reflecting material. The device reflects solar energy to a movably supported collector that is kept at the concentrated line focus of the reflector primary. The primary reflector may be constructed by a process utilizing well-known freeway paving machinery.

N79-14536* National Aeronautics and Space Administration
Lewis Research Center Cleveland, Ohio
CATALYST SURFACES FOR THE CHROMOUS/CHROMIC REDOX COUPLE Patent Application
Jose D Giner (Giner, Inc, Waltham, Mass) and Kathleen J Cahill inventors (to NASA) (Giner, Inc, Waltham, Mass) filed 29 Nov 1978 13 p Sponsored by NASA (NASA-Case-LEW-13148-1 US-Patent-Appl-SN-964754) Avail NTIS HC A02/MF A01 CSCL 10A

An electricity-producing cell of the reduction-oxidation (REDOX) type is presented. The cell comprises a container divided into anode and cathode compartments by an ion permeable membrane. The novelty of the invention appears to lie in the provision of selected catalytic coatings with lead on the anode electrode of a REDOX cell to greatly increase current density.
A flexible solar array strip is formed by providing printed circuitry between flexible layers of a nonconductive material, depositing solder pads on the printed circuitry and storing the resulting substrate on a drum from which it is then withdrawn and advanced along a linear path. Solderless solar cells are serially transported into engagement with the pads and are infrared radiation to melt the solder and attach the cells to the circuitry. Excess flux is cleaned from the solar cells which are then encapsulated in a protective coating. The resulting array is then wound on a drum.
AN IMPROVED SOLAR PANEL AND METHOD FOR FABRICATING THE SAME Patent Application


A method for the fabrication of solar panels and in particular laminated solar panels is presented. The method has steps which are particularly adaptable for automation. The solar panel is fabricated by electrically interconnecting a plurality of individual solar cells into a plurality of strings and connecting the plurality of strings into an array. The array is laminated between a pair of transparent plates.

METHOD AND APPARATUS FOR FABRICATING IMPROVED SOLAR CELL MODULES Patent Application

Joseph T Bloch (Boeing Aerospace Seattle Wash) Randolph T Hanger (Boeing Aerospace Seattle Wash) and Frank W Nichols inventors (to NASA) (Boeing Aerospace Seattle) Filed 23 Feb 1979 16 p (Contract JPL-953984) (NASA-Case-NPO-14416-1 US-Patent-App1-SN-014664) Avail NTIS HC A02/MF A01 CSCL 10A

The apparatus includes a supply drum for feeding a flexible strip having deposited thereon etched electrical circuitry.

ATOMIC HYDROGEN STORAGE METHOD AND APPARATUS Patent Application


Atomic hydrogen for use as a fuel or 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 compound is 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 combining to form molecules.

MULTI-CHANNEL ROTATING OPTICAL INTERFACE FOR DATA TRANSMISSION Patent Application


An apparatus is presented for transmitting multiple channels of data across a rotating interface such as between an antenna that rotates with respect to a platform. It includes a plurality of light-emitter elements and light detector elements located on the two bodies that rotate relative to each other. A lens for focusing light from each emitter element onto a corresponding detector element is provided.
includes air, noise, thermal, and water pollution for environment monitoring and contamination control.

**N79-20613** National Aeronautics and Space Administration Pasadena Office, Calif

**AN IMPROVED SOLAR ENERGY RECEIVER FOR A STIRLING ENGINE Patent Application**

M. Kudret Selçuk, inventor (to NASA) (JPL) Filed 6 Apr 1979

12 p (Contract NAS7-100)

(NASA-Case-NPO-14619-1, US-Patent-Appl-SN-027559) Avail NTIS HC A02/MF A01 CSCL 10A

Damage to a Stirling engine is prevented by using a solar receiver of separable configuration to reduce solar flux density in order to protect the heat exchanger contained within the receiver. A solar energy receiver includes a separable endless wall formed of a ceramic material in which a cavity of a substantially cylindrical configuration is defined for entrapping solar flux. An acceptance aperture admits a concentrated beam of solar energy to the cavity. The wall is characterized by at least one pair of contiguously 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 pivotal displacement of one segment, so that thermal flux is permitted to escape from the cavity.

**N79-21639** National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt Md

**SOLAR CELL MODULE ASSEMBLY JIG Patent**

Herbert W. Farrell, inventor (to NASA) (TRW, Inc Redondo Beach, Calif) Issued 26 Jul 1966 7 p Filed 10 Jun 1963 Sponsored by NASA


The invention relates to the manufacture of solar cell modules and more particularly to a jig for assembling positioning and maintaining the components under resilient pressure, while the entire assembly and the jig is subjected to heat for simultaneously soldering all of the various circuit connections, as well as structurally bonding the layers into a strong light weight structure which minimizes the tendency of the solar cells to crack and the other components and electrical connections to fracture.

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

**N79-10670** National Aeronautics and Space Administration Langley Research Center, Hampton Va

**SMOKESTACK-MOUNTED AIRFOIL Patent**

Robert C. Costen, inventor (to NASA) Issued 11 Jan 1978 12 p Filed 10 Nov 1975 Supersedes N76-13419 (14 04 p 0449)


A system for improving the effluent dispersal characteristics of smokestacks subject to relative winds comprising a vortex generating airfoil attached to a smokestack near the stack gas exit is described. Relative winds passing over the airfoil create strong vortices which entrain and hold together smokestack effluents until the vortices deteriorate. The vortex flow direction

**45 ENVIRONMENT POLLUTION**

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

and angle of ascension is controlled in order to achieve optimum effluent dispersal by varying the airfoil angle of attack.

Official Gazette of the U.S. Patent Office

46 GEOPHYSICS

Includes aeronomy, upper and lower atmosphere studies, ionospheric and magnetospheric physics, and geomagnetism.

For space radiation see 93 Space Radiation

N79-19521 National Aeronautics and Space Administration
Pasadena Office, Calif.

BOREHOLE GEOLOGICAL ASSESSMENT Patent Application

William Spuck III, inventor (to NASA) (JPL) Filed 4 May 1978
19 p. Sponsored by NASA
NTIS HC A02/FP A01 CSCL 08G

A method and apparatus are provided for performing geologic assessments of a formation located along a borehole which includes a boring tool that bores a pair of holes into the walls of the borehole and into the surrounding strata, and a pair of probes installed in the holes. One of the probes applies an input such as a current or pressured fluid and the other probe senses a corresponding input which it receives from the strata. The boring tool can include a series of rigid bore segments that can be easily installed in a housing that lies in the borehole and apparatus for connecting the bore segments in series while also advancing them into the strata surrounding the borehole, so that a straight hole can be bored in the strata.

N79-20666 National Aeronautics and Space Administration
Pasadena Office, Calif.

A SYSTEM FOR PLOTTING SUBSOIL STRUCTURE AND METHOD THEREOF Patent Application

Keshavayengar Y Narashimhan (JPL), Shakkottai P Parthasarathy (JPL), and Robert Nathan, inventors (to NASA) (JPL) Filed 6 Sep 1977 19 p. Sponsored by NASA
NTIS HC A02/FP A01 CSCL 08G

Data for use in producing a tomograph of subsoil structure between boreholes is derived by placing spaced geophones in one borehole, and if desired also on the earth surface and by producing a sequence of shots at spaced apart locations in the other borehole. The signals, detected by each of the geophones from the various shots are processed either on a time of arrival basis or on the basis of signal amplitude, to provide information of the characteristics of a large number of incremental areas.
A system to determine substructure permeability is described. Bursts of signals at different frequencies are induced into substructure, adjacent a borehole. The return signals from each burst of signals are normalized to compensate for the attenuation experienced by more distant return signals. The peak amplitudes of return signals above a selected level, are cut off, and an average signal is produced from the normalized amplitude-limited return signals of each burst. The averaged signals of the return signals of all the signal bursts at the different frequencies are processed, to provide a combined signal whose amplitude is related to the microfracture density of the substructure adjacent to the borehole.

A system which utilizes a barometer to measure oceanic waves is presented. The basic novelty of the invention lies in combining the technique of obtaining a height signal by barometric measurement and effecting crest-to-trough measurements each half cycle of wave motion whereby a complete history of crest-to-trough and trough-to-crest measurements is recorded. The invention conveniently provides for the additional measurements of average wave frequency and significant wave height.
needed at any time during the freezing process. The temperature of the bag and hence of the tissue is compared with a time programmed desired value for the tissue temperature to derive an error indication. The heater is activated in response to the error indication so that the temperature of the tissue follows the desired value for the temperature programmed tissue temperature. The tissue is heated to compensate for excessive cooling of the tissue as a result of the cooling by the refrigerating gas. In response to the error signal, the heater is deactivated while the latent heat of fusion is being removed from the tissue while the tissue is changing phase from liquid to solid.

Official Gazette of the U.S. Patent Office

N79-10694* National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt, Md
SYSTEM FOR AND METHOD OF FREEZING BIOLOGICAL TISSUE Patent
(NASA-Case-GSC-12173-1 US-Patent-4117881

Biological tissue is frozen while a polyethylene bag placed in abutting relationship against opposed walls of a pair of heaters. The bag and tissue are cooled with refrigerating gas at a time programmed rate at least equal to the maximum cooling rate. Marker virus present on the filter. Photo-optical detection of indirect passive immune agglutination by polystyrene beads indicates the performance of the water reclamation system in removing the marker virus. A closed system provides for concentrating any marker virus initiating and monitoring the passive immune agglutination reaction and then flushing the system to prepare for another sample.

Official Gazette of the U.S. Patent Office

N79-21743* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
A METHOD FOR SEPARATING BIOLOGICAL CELLS Patent Application
D.E. Brooks, inventor (to NASA) 6 Mar 1979 11 p
(NASA-Case-MFS-23883-1 US-Patent-App-SN-017888) Avail NTIS HC A02/MF A01 CSCL 06C

A method for separating biological cells by suspending a mixed cell population in a body of aqueous polymer is described. The system consists of phases for which these cells exhibit an affinity including at least one droplet phase with a surface potential and one droplet phase characterized by another surface potential. The system is subjected to an electrostatic field established between a pair of electrodes with the field being of sufficient intensity for causing some of the droplets to migrate toward one of the electrodes with an attendant separation of the cells.

Official Gazette of the U.S. Patent Office

N79-10724* National Aeronautics and Space Administration
Ames Research Center Moffett Field, Calif
CONTOUR DETECTOR AND DATA ACQUISITION SYSTEM FOR THE LEFT VENTRICULAR OUTLINE Patent
(NASA-Case-ARC-10985-1 US-Patent-4101961

A real-time contour detector and data acquisition system is described for an angiographic apparatus having a video scanner for converting an X-ray image of a structure characterized by a change in brightness level compared with its surrounding into video format and displaying the X-ray image in recurring video fields. The real-time contour detector and data acquisition system includes track and hold circuits. a reference level analog computer.
circuit, an analog comparator, a digital processor, a field memory, and a computer interface.

An automatic chromosome analysis system is provided wherein a suitably prepared slide with chromosome spreads thereon is placed on the stage of an automated microscope. The automated microscope stage is computer operated to move the slide to enable detection of chromosome spreads on the slide. The X and Y location of each chromosome spread that is detected is stored. The computer measures the chromosomes in a spread and classifies them by group or by type and also prepares a digital karyotype image. The computer system can also prepare a patient report summarizing the result of the analysis and listing suspected abnormalities.
DETERMINATION OF ANTIMICROBIAL SUSCEPTIBILITIES ON INFECTED URINES WITHOUT ISOLATION

Patent

A method is described for the quick determination of the susceptibilities of various unidentified bacteria contained in an aqueous physiological fluid sample, particularly urine, to one or more antibiotics. A bacterial adenosine triphosphate (ATP) assay is carried out after the elimination of non-bacterial ATP to determine whether an infection exists. If an infection does exist, a portion of the sample is further processed including subjecting parts of the portion to one or more antibiotics. Growth of the bacteria in the parts are determined, again by an ATP assay, to determine whether the unidentified bacteria in the sample are susceptible to the antibiotic or antibiotics under test.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

COUPLING APPARATUS FOR ULTRASONIC MEDICAL DIAGNOSTIC SYSTEM

Patent
Robert E. Frazer, inventor (to NASA) (JPL) Issued 19 Dec 1978

An apparatus for the ultrasonic scanning of a breast or other tissue is reported that contains a cavity for receiving the breast, a vacuum for drawing the breast into intimate contact with the walls of the cavity, and transducers coupled through a fluid to the cavity to transmit sound waves through the breast. Each transducer lies at the end of a tapered chamber which has flexible walls and which is filled with fluid, so that the transducer can be moved in a raster pattern while the chamber walls flex accordingly with sound transmission always occurring through the fluid.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

INOOMETHACIN ANTIHISTAMINE COMBINATION FOR GASTRIC ULCERATION CONTROL

Application
Patricia A. Brown (San Jose State Univ., Calif.) and Joan Varnikos-Danelis, inventors (to NASA) Filed 29 Dec 1978

Gastric ulcers caused by the ingestion of indomethacin by subjects under stress are significantly reduced by administering to the subjects, together or in sequence such antihistaminic drugs as pyrilamine, promethazeme, metiamide, or cimetidine. The dosages may range from 25 to 200 mg daily for the indomethacin and from 200 mg to 1.5 g daily for the antihistamine.

MEAN ULCER SCORE

MEAN PERCENT INHIBITION

PROSTHETIC URINARY SPHINCTER

Application
Curtis R. Helms and Harold M. Smyly, inventors (to NASA) Filed 12 Oct 1978

A pump/valve unit which requires a minimum of implant area and surgery is described for controlling bladder function by regulating the inflation and deflation of a urethral collar in a prostatic urinary sphincter device. The pump has a press bulb of silicone elastomer which provides a reservoir for fluid solution. The valve unit includes a movable member which operates by depression of a flexible portion of the valve unit housing in order to control fluid flow between the reservoir and the collar. A pressure sensing means operates the valve member in order to relieve excess pressure in the collar should too much pressure be applied by the patient.
The invention relates in general to a subcutaneous electrode structure useful as a chronic implant for taking electrocardiograms of active animals. The electrode comprises a thin inflexible smooth disc of stainless steel having a diameter of 5 to 30 millimeters which is sutured in place to the tissue of the animal being monitored by means of a plurality of sutures passing through suture holes in the periphery of the disc. An electrical connection is made to the disc by means of a flexible lead wire that extends longitudinally of radially directed slot in the disc and held there at the terminal end by means of a spotwelded tab. An electrically insulative sleeve, such as silicon rubber, is placed over the wire. The wire with the sleeve is captured in the plane of the disc and within the slot by means of crimping tabs extending laterally across the slot and over the insulated wire.
54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

APPARATUS FOR SUPPLYING CONDITIONED AIR AT A SUBSTANTIALLY CONSTANT TEMPERATURE AND HUMIDITY Patent Application


An air conditioning system is described which does not require expensive and energy consuming equipment to maintain constant air temperature and humidity. A by-pass duct couples to a supply duct selectively directs proportions of supplied and return conditioned air around a temperature reducing device. Another by-pass duct coupled to the return duct selectively directs portions of the return circulated air around both the supply duct and the temperature reducing device. A controller device selectively regulates the amount of flow and the mixing of the supplied and return conditioned air flowing through the temperature reducing device and within the supply duct, the return duct, and the two by-pass ducts. A circulating mechanism within the supply duct moves the supply air, the return conditioned air, and the conditioned air through the various ducts. The apparatus is designed to uniformly control temperature and humidity in computer facilities.

PROTECTIVE GARMENT VENTILATION SYSTEM Patent


A method of and apparatus for ventilating a protective garment wherein the direction of flow of a ventilating and purging gas within portions of the garment may be reversed in order to compensate for changes in environment and activity of the wearer, is presented. The method and apparatus also contemplates the establishment of a condition wherein the entire flow of ventilating gas is first directed to a helmet associated with the garment.

TERMINAL GUIDANCE SENSOR SYSTEM Patent Application


A system is described for guiding a claw to the proper distance and into the proper orientation in yaw and pitch, to engage a grappling fixture. The system includes four proximity sensors on the claw, that are arranged at the corners of an imaginary square, which sense the distance to the top surface of the grappling fixture. If a pair of sensors at opposite corners of the square sense a different distance to the top surface of the grappling fixture then it is known that the claw is rotated about a corresponding axis with respect to the plane of the grappling fixture.

Official Gazette of the U.S. Patent and Trademark Office.
EMERGENCY SPACE-SUIT HELMET Patent
Harvey A Smith inventor (to NASA) (United Aircraft Corp E Hartford, Conn) Issued 2 Jun 1970 4 p Filed 24 Feb 1966 Sponsored by NASA

A collapsible automatically extensible, emergency space helmet is described. The unit when deflated is carried on the back of the wearer, attached to the suit, so as not to interfere with normal activities. When inflated the head of the wearer is completely encapsulated.

DIGITAL DATA REFORMATTER/DESERIALIZER Patent

A method and apparatus is presented for reformatting and de-serializing a serially-received sequence of data words each consisting of a fixed number of binary data bits. A block of n bits is serially fed into a shift register or serially-connected group of shift registers. In lieu of the (n-1)th shift the bits are rearranged within the shift register in parallel fashion, according to a prescribed scheme. Shifting then continues, until the first bit of each data word appears in the last bit position in the shift register at which time that data word is shifted in parallel into an output buffer stage from which it is outputted in parallel, after a fixed delay.

HIGH-SPEED MULTIPLEXING OF KEYBOARD DATA INPUTS Patent Application
Tage O Anderson inventor (to NASA) (JPL) Filed 29 Dec 1978 18 p Sponsored by NASA
(Contract NAS-100) (NASA-Case-NPO-14554-1 US-Patent-App-SN-974473) Available NTIS HC A02/MF A01 CSCL 09B

A method and apparatus are provided for a high speed multiplexing system in which keyboard entered data is sequentially and automatically sampled by a multiplexer for input to a computer. A sequencer is provided which sequentially and automatically controls the multiplexer so that each keyboard data input is sampled in accordance with a predetermined sampling.

SOUND-SUPPRESSING STRUCTURE WITH THERMAL RELIEF Patent
Dudley O Nash (GE, Cincinnati) and Joseph Holowach inventors (to NASA) Issued 15 Aug 1978 5 p Filed 2 Jul 1976 Sponsored by NASA

Sound-suppressing structure comprising stacked acoustic panels wherein the inner high frequency panel is mounted for thermal expansion with respect to the outer low frequency panel. Discussed slip joints eliminate the potential for thermal stresses, and a thermal expansion gap between the panels provides for...
ACOUSTICS

additional relative thermal growth while reducing heat convection into the low frequency panel.

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

ACOUSTIC DRIVING OF ROTOR Patent
Hilda Kanber (JPL), Isadore Rudnick (JPL), and Taylor G. Wang inventors (to NASA) (JPL) Issued 15 Feb 1979 4 p Filed 5 Jul 1977 Supersedes N78-22859 (16 - 13 p 1773) Sponsored by NASA

Sound waves are utilized to apply torque to a body in an enclosure of square cross section, by driving two transducers located on perpendicular walls of an enclosure at the same frequency but at a predetermined phase difference such as 90 degrees. The torque is a first order effect so that large and controlled rotational speeds can be obtained.

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

OPTICS

Includes light phenomena

STABILIZATION OF He2(a 3 SIGMA u+) MOLECULES IN LIQUID HELIUM BY OPTICAL PUMPING FOR VACUUM UV LASER 8 Patent

An apparatus is described for measuring the effectiveness of stray light suppression light shields and baffle arrangements used in optical space experiments and large space telescopes. The light shield and baffle arrangement and a telescope model are contained in a vacuum chamber. A source of short high-powered light energy illuminates portions of the light shield and baffle arrangement and reflects a portion of same to a photomultiplier tube by virtue of multipath scattering. The resulting signal is transferred to time-channel electronics timed by the firing of the high energy light source allowing time discrimination of the signal thereby enabling the light scattered and
An illumination control apparatus is presented for supplementing light from solar radiation with light from an artificial light source to compensate for periods of insufficient levels of solar light. The apparatus maintains a desired illumination level within an interior space comprising an artificial light source connected to an electrical power source with a switch means for selectively energizing said light source. An actuator means for controlling the on-off operation of the switch means is connected to a light sensor which responds to the illumination level of the interior space. A limit switch carried adjacent to the actuator limits the movement of the actuator within a predetermined range so as to prevent further movement thereof during detection of erroneous illumination conditions.

N79-11866* National Aeronautics and Space Administration Langley Research Center Hampton, Va

**NONCONTACTING METHOD FOR MEASURING ANGULAR DEFLECTION Patent Application**

Emmett L Bryant, inventor (to NASA) Filed 23 Oct 1978 8 p

(NASA-Case-LAR-12178-1 US-Patent-Appl-SN-953390) Avail NTIS HC A02/MF A01 CSCL 20F

An electro-optical means for measuring instantaneous angular deflections of an object without requiring mechanical contact with the object is described. A flat refractor is attached to the object whose angular deflections are to be measured. Light from a light source is passed through the first refractor onto a converging lens which converges the light through a second refractor onto a differential photocell. The output of the differential photocell is applied through a high gain amplifier to a galvanometer which is attached to the second refractor so that it rotates about an axis that is parallel to the axis of the first refractor. Any deflection of the object about the axis of the first refractor generates a current at the output of the photocell causing the galvanometer to rotate the second refractor to make the output of the photocell approach zero. This results in the galvanometer current being substantially proportional to the angular deflection of the object.

N79-12890* National Aeronautics and Space Administration John F Kennedy Space Center Cocoa Beach, Fla

**ILLUMINATION CONTROL APPARATUS FOR COMPENSATING SOLAR LIGHT Patent**


A servo controlled target replica, and a surface bearing a computer generated line drawing of an object are individually viewed by separate television cameras allowing a two-dimensional composite of the target replica and the object to be displayed on a monitor simulating what an observer would see through a window in a spacecraft. The target replica is coded along one self coordinate axis in such a way that the distance of an elemental area on the target along the axis is capable of being remotely readout by a television camera. A third television camera responsive to the code reads out this information by which the Z-coordinate, relative to the observer
can be calculated, on-line with the scan, for the contents of each picture element of the scene televised by the target camera.

An in-line optical display lens comprising a front convex-convex element, a central convex-concave element, and a rear convex-convex element was designed for use in the flight simulators, which require presentation of a realistic visual display to the pilot operating the flight simulator. The lens, located between the pilot operating the simulator and a closed circuit television monitor or similar device, serves to magnify the image and causes the image to appear to be at a distance. The specific radius of curvature of the lens elements. precise lens element spacing and thickness and the indices of refraction for the lens elements, relieve angular strain on a pilot during operation of a flight simulator. The use of acrylic and polystyrene elements results in a lens that is both lighter in weight and less expensive than similar lens made with glass elements.

A birefringent filter module comprises, in senatum (1) an entrance polarizer (2) a first birefringent crystal responsive to optical energy exiting the entrance polarizer (3) a partial polarizer responsive to optical energy exiting the first polarizer (4) a second birefringent crystal responsive to optical energy exiting the partial polarizer, and (5) an exit polarizer. The first and second birefringent crystals have fast axes disposed + or -45 deg from the high transmitivity direction of the partial polarizer. Preferably, the second crystal has a length 1/2 that of the first crystal and the high transmitivity direction of the partial polarizer is nine times as great as the low transmitivity direction. To provide tuning the polarizations of the energy entering the first crystal and leaving the second crystal are varied by either rotating the entrance and exit polarizers, or by sandwiching the entrance and exit polarizers between pairs of half wave plates that are rotated relative to the polarizers. A plurality of the filter modules may be cascaded.

Thermal diffusivity and molecular relaxation processes in a sample material are measured by using a pulsed laser light beam which forms a thermal lens in the sample material, and a relatively low power probe light beam which detects changes in the refractive index of the sample material during formation and dissipation of the thermal lens. By integrating a large number of successive formation and dissipation cycles, a composite curve can be developed and used to accurately determine thermal diffusivity and molecular relaxation characteristics of the sample material. The use of thermooptical techniques provides a means for conducting nondestructive tests using both isotropic and anisotropic materials which can be either transparent or opaque to the light sources being utilized. Thermal diffusivity and molecular relaxation characteristics can be measured using a sample undergoing stress test or a sample which is shock-sensitive.
A system for use in Schlieren photography includes (1) a viewing screen adjacent to a large grating, (2) a small grating disposed in spaced relation with the large grating (3) a transparent retainer for confining a transparent medium between the gratings, and (4) optics for imaging the small grating on the large grating. A light source and optically aligned lens are used to project a beam of light along axes extending through the small grating and strike the large grating subsequent to passing through the medium. A Schlieren image of distortions resulting from distortions of light rays produced by the medium are formed on the screen. A camera is used to photograph the Schlieren image projected on the large screen.

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

A hydrogen source is disclosed which includes a chamber having at one end a cathode which provides electrons and through which hydrogen gas flows into the chamber. Screen and accelerator grids are provided at the other end of the chamber. A baffle plate is placed between the cathode and the grids, and a cylindrical baffle is disposed coaxially with the cathode at the one end of the chamber. The cylindrical baffle is of greater diameter than the baffle plate to provide discharge impedance and also to protect the cathode from ion flux. An anode electrode draws the electrons away from the cathode. The hollow cathode includes a tubular insert of tungsten impregnated with a low work function material to provide a sufficient electron current. A heater is provided around the hollow cathode to initiate electron emission from the low work function material. The source provides hydrogen or deuterium ions at a beam current density exceeding 0.1 amperes (A)/sq cm and has a discharge current which can exceed 100A for duty cycles of several minutes.

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

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

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A METHOD AND MEANS FOR GROWING RIBBON CRYSTALS WITHOUT SUBJECTING THE CRYSTALS TO THERMAL SHOCK-INDUCED STRAINS

Patent Application

N79-10917*# National Aeronautics and Space Administration Pasadena Office Calif
A susceptor particularly suited for use in growing crystal ribbons is described which employs edge-defined film-fed growth techniques and is characterized by a die through which a melt is drawn for forming a crystal ribbon. A pair of jets are adjacent to the die for directing streams of fluid coolant along paths extended to impinge on the susceptor in close proximity with the die but in non-incident relation with the crystal ribbon being formed. The growth of a crystal is stabilized without subjecting the resulting crystal to strain-inducing effects of thermal shock. NASA

N79-10918*# National Aeronautics and Space Administration Pasadena Office Calif
AN IMPROVED APPARATUS FOR USE IN THE PRODUCTION OF RIBBON-SHAPED CRYSTALS FROM A SILICON MELT

Patent Application

N79-10919*# National Aeronautics and Space Administration Pasadena Office Calif
METHOD OF CONTROLLING DEFECT ORIENTATION IN SILICON CRYSTAL RIBBON GROWTH

Patent

N79-11920* National Aeronautics and Space Administration Pasadena Office Calif
METHOD OF CONTROLLING DEFECT ORIENTATION IN SILICON CRYSTAL RIBBON GROWTH

Patent
MULTILEVEL METALLIZATION METHOD FOR FABRICATING A METAL OXIDE SEMICONDUCTOR DEVICE Patent

An improved method is described of constructing a metal oxide semiconductor device having multiple layers of metal deposited by dc magnetron sputtering at low dc voltages and low substrate temperatures. The method provides multilevel interconnections and cross-over between individual circuit elements in integrated circuits without significantly reducing the reliability or seriously affecting the yield.

MANGANESE BISMUTH FILMS WITH NARROW TRANSFER CHARACTERISTICS FOR CURIE-POINT SWITCHING Patent

Manganese bismuth films having improved characteristics for recording information in analogue form, can be produced by a vacuum deposition of Bi and Mn with an atomic ratio of Mn to Bi between 2 and 3.5 or 1.4 and 1.6, followed by a specialized heat treatment which includes very brief exposure to a temperature between about 275 deg and 300 C. Similar MnBi films can be produced more reliably and reproducibly if the initial Bi layer is annealed prior to deposition of the Mn layer. Such an annealing step renders most other factors of the processing relatively non-critical. Deposition of both initial layers is preferably carried out in a vacuum approaching 10^-8 Torr.

PHOTOMECHANICAL TRANSDUCER Patent Application

A single low cost, non-electrical photomechanical transducer is described which comprises an ultrathin strip of polymeric or metallic film having an efficient absorptive surface. When the strip is held under small and constant strain in a stress-strain analyzer, the strip responds to light in a quick and reversible manner. The absorptive face of a rectangular test strip is mounted toward an illumination source. One end of the strip is clamped and screwed to a movable support, the other is attached to a strain gage by a clamp and a lead. The strain gage is connected to a chart recorder which contains typical amplification and graphic instrumentation. A mask placed across the strip provides a controlled illumination area. Many different measuring, switching, and prime mover devices can be constructed based on this simple transduction.

METHOD FOR THE PREPARATION OF INORGANIC SINGLE CRYSTAL AND POLYCRYSTALLINE ELECTRONIC MATERIALS Patent

Large area semiconductor crystals selected from group 3-5 compounds and alloys are provided for semiconductor device fabrication by the use of a selective etching operation which completely removes the substrate on which the desired crystal was deposited. The substrate selected from the same group as the single crystal, has a higher solution rate than the epitaxial single crystal which is essentially unaffected by the etching solution. The preparation of gallium phosphide single crystals using a gallium arsenide substrate and a concentrated nitric acid etching solution is described.
85 URBAN TECHNOLOGY AND TRANSPORTATION

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.

N79-17747* National Aeronautics and Space Administration Pasadena Office, Calif.

PROCESS FOR PURIFICATION OF WASTE WATER PRODUCED BY A KRAFT PROCESS PULP AND PAPER MILL Patent


The water from paper and pulp wastes obtained from a mill using the Kraft process is purified by precipitating lignins and lignin derivatives from the waste stream with quaternary ammonium compounds, removing other impurities by activated carbon produced from the cellulosic components of the water and then separating the water from the precipitate and solids. The activated carbon also acts as an aid to the separation of the water and solids if recovery of lignins is also desired, then the precipitate containing the lignins and quaternary ammonium compounds is dissolved in methanol. Upon acidification, the lignin is precipitated from the solution. The methanol and quaternary ammonium compound are recovered for reuse from the remainder.

N79-10969* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville Ala.

ANASTIGMATIC THREE-MIRROR TELESCOPE Patent


A three-mirror telescope for extraterrestrial observations is described. An ellipsoidal primary mirror, a hyperbolic secondary mirror and an ellipsoidal tertiary mirror produce an image in a conveniently located finite plane for viewing.

N79-10995* National Aeronautics and Space Administration Hughes L. Dryden Flight Research Center Edwards, Calif.

ANTI-AIRCRAFT SYSTEM AND METHOD EMPLOYING SMALL PROJECTILES Patent Application


A system and method are presented for disabling low flying aircrafts without the need to aim destructive matter at the aircrafts. The novelty of the invention is believed to be based on the dispersion of elements in an airspace which an acquired aircraft has to traverse, without having to aim the elements at the aircraft. The system comprising in contact with the aircraft, contribute to its destruction.

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This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. This issue of the Abstract Section cites 240 patents and applications for patent introduced into the NASA scientific and technical information system during the period of January 1979 through June 1979. 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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