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 1974 and June 1974.
ACCESSION NUMBER RANGES

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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 Tisco, Inc.
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 May 1969. Thus a complete set of NASA PAB would consist of the Abstract Section of Issue 04 (January 1974), the Abstract Section for all subsequent issues, and the Index Section for the most recent issue.

The 217 citations published in this issue of the Abstract Section cover the period January 1974 through June 1974. The Index Section contains references to the 2653 citations covering the period May 1969 through June 1974.

ABSTRACT SECTION (SECTION 1)

The Abstract Section is divided into 34 subject categories (See Table of Contents for scope note of each category) under which are grouped appropriate NASA inventions. Each entry in the Abstract Section consists of STAR citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned in STAR to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

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

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

These data elements appear 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 FROM

PATENT ABSTRACTS BIBLIOGRAPHY

NASA SPONSORED DOCUMENT

NASA ACCESSION NUMBER

WHOLE BODY MEASUREMENT SYSTEMS Patent

INVENTOR

John S. Ogle, inventor (to NASA) Issued 6 Nov. 1973 5-p

FILED 18 Nov. 1971 Supersedes N72-20105 (10 - 11, p 1433)

Sponsored by NASA

US PATENT NUMBER

S-799,834

US-Patent-3.769.834

U.S. PATENT OFFICE CLASSIFICATION NUMBER

US-Patent-Class-128-25

COSATI CODE

US-Patent-Class-128-25

US-Patent-Class-72-148

AVAILABILITY

Avail. : US Patent Office, CSCL 068

A system for measuring the volume and volume variations of a human body under zero gravity conditions is disclosed. An enclosed chamber having a defined volume and arranged for receiving a human body is provided with means for infrasonically varying the volume of the chamber. The changes in volume produce resultant changes in pressure, and under substantially isentropic conditions, an isentropic relationship permits a determination of gas volume which, in turn, when related to total chamber volume permits a determination of the body volume.

By comparison techniques, volume changes of a human independent of gravity conditions can be determined.

Official Gazette of the U.S. Patent Office

KEY ILLUSTRATION
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 34 subject categories in this issue of NASA PAB, select the desired Subject Category in the Abstract Section and find the inventions abstracted thereunder. The abstracts are arranged in each Subject Category in order of the ascending Accession Number originally assigned in STAR to each invention.

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 latest issue of 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 Office Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.
Copies of U.S. patents may be purchased directly from the U.S. Patent Office, Washington, D.C. 20231, for fifty cents a copy.

Copies of pending NASA applications for patent, abstracted in NASA PAB, are sold by the National Technical Information Service, Springfield, Virginia 22151, at the price shown in the citation. Microfiche are sold at the established unit price of $1.45. When ordering copies of an application for patent from NTIS, the U.S. Patent Application Serial Number listed in the index or shown in the citation for each abstract should be used to identify the desired application for patent.

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, 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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The NASA Domestic Patent Licensing Regulations (14 C.F.R. 1245.2) are reproduced on the following pages. 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.
Title 14—AERONAUTICS AND SPACE

Chapter V—National Aeronautics and Space Administration

PART 1245—PATENTS

Subpart 2—Patent Licensing Regulations

§1245.200 Scope of subpart.

§1245.201 Definitions.

§1245.202 Basic considerations.

§1245.203 Licenses for practical application of inventions.

§1245.204 Other licenses.

§1245.205 Application for nonexclusive license.

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§1245.207 Processing for application.

§1245.208 Processing for application for license.

§1245.209 Royalties and fees.

§1245.210 Reports.

§1245.211 Revocation of licenses.

§1245.212 Appeals.

§1245.213 Litigation.

§1245.214 Address of communications.

Authority: The provisions of this Subpart 2 issued under 42 U.S.C. 2457, 2478(b) (3).

§1245.200 Scope of subpart.

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

§1245.201 Definitions.

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

(a) "Invention" means an invention covered by a U.S. patent or patent application for which the Administrator of NASA 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 eligible for short-form licensing procedures. An invention may be designated as a special invention when a determination is made that:

1. A practical application has occurred and is likely to continue for the life of the patent and for which an exclusive license is not in force, or
2. The public interest would be served by the expeditious granting of a nonexclusive license for practice of the invention by the public.

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

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

(g) The "Inventions and Contributions Board" means the NASA Inventions and Contributions Board established by the Administrator of NASA within the Administration in accordance with section 305 of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).
§ 1245.205 listing the invention as available for licensing has been published in the Federal Register at least 9 months; or a patent covering the invention has been issued for at least 6 months. However, a limited exclusive license may be granted prior to the expiration of the patent if the Administrator determines that the public interest will be best served by the earlier grant of an exclusive license.

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

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

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

(5) The license shall require the licensor to expend a specified minimum sum of money and/or to take other specified actions, within indicated periods of time, as a condition of the issuance of the license, in an effort to achieve practical application of the invention.

(6) The license shall be subject to at least an irrevocable royalty-free right of the Government of the United States to practice the invention within a specified time period as shown in the license and then to achieve practical application of the invention.

(7) The license may reserve to the Administrator, NASA, under the following circumstances the right to require the grant of a sublicense to responsible applicant(s) on terms that are considered reasonable by the Administrator, taking into consideration the current royalties rate at a similar patent and other pertinent factors: (1) To the extent that the invention is required for public use, and (2) if the invention be required for the fulfillment of health or safety needs, or (3) for other purposes stipulated in the license.

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

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

(10) The license may be subject to such other reservations as may be in the public interest.

§ 1245.204 Other licenses.

(a) License to contractor. There is hereby granted to the contractor reporting an invention made in the performance of work under an exclusive license of NASA in the manner specified in section 305(a) (1) or (2) of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457(a) (1) or (2)), a revocable, nonexclusive, royalty-free license for the purposes of acquiring or using any and all rights in the invention with the right to grant sublicenses of the same scope to the extent the contractor was legally obligated to do so at the time the contract was awarded. Such license and right is nontransferable except to the successor of that part of the contractor's business to which the invention pertains.

(b) Miscellaneous licenses. Subject to any outstanding licenses,规则 in this subpart, the Administrator, the licensee may grant (1) Identification of Invention for sublicenses ... which license is desired, including the license granted by an exclusive licensee NASA patent case number, patent application serial number or patent number, title and date, if known.

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

(1) Identification of invention for which license is desired, including the NASA patent case number, patent application serial number or patent number, title and date, if known; (2) Name and address of company or organization applying for license; and (3) If name and address of representative of applicant to whom correspondence should be sent.

§ 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 of § 1245.203, an 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 designed by the Government as economically depressed.

(2) A statement indicating the time, expenditure, and other acts which the applicant considers necessary to practical application of the invention, and the applicant's offer to invest that sum and 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

cense and that such an exclusive license should be granted to the applicant.

§ 1245.208 Processing applications for license.

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

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

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

(d) Determination of Administrator and grant of exclusive licenses—(1) Notice. If the Administrator determines that the best interest of the United States will be served by granting an exclusive license in accordance with the basic considerations set forth in §§ 1245.202 and 1245.203, a notice shall be published in the Federal Register, announcing the intent to grant the exclusive license, the identification of the invention, special terms or conditions of the license and a statement that NASA will grant the exclusive license unless within 30 days of the publication of such notice the Inventions and Contributions Board receives in writing any of the following together with supporting documentation:

(i) A statement from any person setting forth reasons why it would not be in the best interest of the United States to grant the proposed exclusive license; or

(ii) An application for a nonexclusive license for the invention in accordance with § 1245.206(b), 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 to grant the exclusive license as the Board initially recommended or whether a different form of license, if any, should instead be granted. Receiving either evidence that practical application of the invention has occurred or is about to occur or, an application for an exclusive license for the invention.

(3) Grant of exclusive licenses. The Administrator shall review the Board’s recommendation and shall determine if the interests of the United States would be best served by the grant of an exclusive license as recommended by the Board. If the Administrator determines to grant the exclusive 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) Any license for an invention may require the payment of royalties, fees or other consideration when the licensing circumstances and the basic considerations set forth in § 1245.202, considered together, indicate that it is in the public interest to do so.

§ 1245.210 Reports.

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

§ 1245.211 Revocation of licenses.

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

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

(c) Before revoking any license granted pursuant to this Subpart 2 for 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 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, its findings of fact, and its recommendation 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 include revocation of all sublicenses which have been granted.

§ 1245.212 Appeals.

Any person may 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 offer evidence in support of his appeal. The procedures for appeal to the Board shall be prescribed. 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 necessary to imply bad faith, or not supported by substantial evidence.

§ 1245.213 Litigation.

An exclusive license to shall be granted the right to sue at his own expense any party who infringes the rights set forth in the license and covered by the licensed patent. The licensee may join the Government, upon consent of the Attorney General, as a party complainant in such suit without expense to the Government and the license shall pay costs and any final judgment or decree that may be rendered against the Govern-
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.
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#### Section 1 • Abstracts

**Subject Categories**

Abstracts in the bibliography are grouped under the following categories:

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- **No. 01 Aerodynamics** includes aerodynamics of bodies, combinations, internal flow in ducts and turbomachinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 32 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

- **No. 02 Aircraft** includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc.; and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

- **No. 03 Auxiliary Systems** includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines; hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

- **No. 04 Biosciences** includes aerospace medicine, exobiology, radiation effects on biological systems; physiological and psychological factors. For related information see also: 05 Biotechnology.

- **No. 05 Biotechnology** includes life support systems, human engineering, protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

- **No. 06 Chemistry** includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.

- **No. 07 Communications** includes communications equipment and techniques, noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.

- **No. 08 Computers** includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics.

- **No. 09 Electronic Equipment** includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors, integrated circuitry; microminiaturization. For basic research see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.

- **No. 10 Electronics** includes circuit theory; and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories.

- **No. 11 Facilities, Research and Support** includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

- **No. 12 Fluid Mechanics** includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

- **No. 13 Geophysics** includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

- **No. 14 Instrumentation and Photography** includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gages; recorders, transducers; aerial photography; and telescopes and cameras.

- **No. 15 Machine Elements and Processes** includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control; reliability; drafting; and materials fabrication, handling, and inspection.

- **No. 16 Masers** includes applications of masers and lasers. For basic research see: 26 Physics, Solid-State.

- **No. 17 Materials, Metallic** includes cermet; corrosion; physical and mechanical properties of materials; metallurgy; and applications as structural materials. For basic research see: 06 Chemistry. For related information see also: 18 Materials, Nonmetallic; and 32 Structural Mechanics.
18 Materials, Nonmetallic
Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.

19 Mathematics
Includes calculation methods and theory, and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

20 Meteorology
Includes climatology; weather forecasting; and visibility studies. For related information see also: 13 Geophysics; and 30 Space Sciences.

21 Navigation
Includes guidance; autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

22 Nuclear Engineering
Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

23 Physics, General
Includes acoustics, Cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics, 20 Meteorology, and 29 Space Radiation.

24 Physics, Atomic, Molecular, and Nuclear
Includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

25 Physics, Plasma
Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

26 Physics, Solid-State
Includes semiconductor theory; and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

27 Propellants
Includes fuels; igniters; and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

28 Propulsion Systems
Includes air breathing, electric, liquid, solid, and magnetohydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics, General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

29 Space Radiation
Includes cosmic radiation; solar flares; solar radiation; and Van Allen radiation belts. For related information see also: 13 Geophysics, and 24 Physics, Atomic, Molecular, and Nuclear.

30 Space Sciences
Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbits and trajectories. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

31 Space Vehicles
Includes launch vehicles; manned space capsules; clustered and multistage rockets; satellites; sounding rockets and probes; and operating problems. For basic research see: 30 Space Sciences. For related information see also: 28 Propulsion Systems; and 32 Structural Mechanics.

32 Structural Mechanics
Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic; and 18 Materials, Nonmetallic.

33 Thermodynamics and Combustion
Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects; and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

34 General
Includes information of a broad nature related to industrial applications and technology, and to basic research; defense aspects; information retrieval; management; law and related legal matters; and legislative hearings and documents.

Section 2 • Indexes

SUBJECT INDEX
INVENTOR INDEX
SOURCE INDEX
NUMBER INDEX
ACCESSION NUMBER INDEX
01 AERODYNAMICS

Includes aerodynamics of bodies, combinations, internal flow in ducts and turbo machinery; wings, rotors, and control surfaces. For applications see: 02 Aircraft and 31 Space Vehicles. For related information see also: 12 Fluid Mechanics; and 33 Thermodynamics and Combustion.

No abstracts in this subject category.
02 AIRCRAFT

Includes fixed-wing airplanes, helicopters, gliders, balloons, ornithopters, etc., and specific types of complete aircraft (e.g., ground effect machines, STOL, and VTOL); flight tests; operating problems (e.g., sonic boom); safety and safety devices; economics; and stability and control. For basic research see: 01 Aerodynamics. For related information see also: 31 Space Vehicles; and 32 Structural Mechanics.

N74-10034* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
LIGHTWEIGHT, VARIABLE SOLIDITY KNITTED PARACHUTE FABRIC Patent
A parachute fabric for aerodynamic decelerator applications is described. The fabric will permit deployment of the decelerator at high altitudes and low density conditions. The fabric consists of lightweight, highly open, circular knitted parachute fabric with ribbon-like yarns to assist in air deflection.
Ofiaal Gazette of the U.S. Patent Office

N74-20646* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRFLOW CONTROL SYSTEM FOR SUPersonic INLETs Patent
Glenn A. Mitchell, inventor (to NASA) and Bobby W. Sanders Issued 26 Mar. 1974 6 p Filed 11 Jun. 1971 Supersedes N71-34017 (09 - 21, p 3375)
In addition to fixed and variable bleed devices provided for controlling the position of a terminal shock wave in a supersonic inlet, a plurality of free piston valves are disposed around the periphery of a cowl wall of a supersonic engine inlet. The free piston valves are disposed in dump passageways, each of which begins at a bleed port in the cowl wall that is located in the throat region of the inlet, where the diameter of the centerbody is near maximum, and terminates at an opening in the cowl wall adjacent a free piston valve. Each valve is controlled by reference pressure.
Official Gazette of the U.S. Patent Office

MULTISTAGE AEROSPACE CRAFT Patent
Donald Lee Kelly, inventor (to NASA) Issued 16 Oct. 1973 1 p Filed 20 Feb. 1964 Sponsored by NASA
A conceptual design of a multi-stage aerospace craft is presented. Two perspective views of the vehicle are developed to show the two component configuration with delta wing, four vertical tail surfaces, tricycle landing gear, and two rocket exhaust nozzles at the rear of the fuselage. Engines for propulsion in the atmosphere are mounted on the fuselage in front of the wing root attachment.
P.N.F.
AUXILIARY SYSTEMS

Includes fuel cells, energy conversion cells, and solar cells; auxiliary gas turbines; hydraulic, pneumatic and electrical systems; actuators; and inverters. For related information see also: 09 Electronic Equipment; 22 Nuclear Engineering; and 28 Propulsion Systems.

N74-10642 National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOLID STATE CONTROLLER THREE AXES CONTROLLER Patent

The reported flight controller features a handle grip which is mounted on a longitudinally extending control element. The handle grip is pivotally mounted on the control element about a pitch axis which is perpendicular to the longitudinal axis through the control element. The pivotal mounting includes a resilient force mounting mechanism which centers the grip relative to the control element. Rotation of the handle grip produces a direct rotation of a transducer element in a transducer which provides an electrical indication of the rotative movement about three mutually perpendicular axes.

Official Gazette of the U.S. Patent Office

N74-19892 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHOD OF MAKING POROUS CONDUCTIVE SUPPORTS FOR ELECTRODES Patent

Porous conductive supports for electrochemical cell electrodes are made by electroforming thin corrugated nickel foil, and by stacking pieces of the corrugated foil alternatively with pieces of thin flat nickel foil. Corrugations in successive corrugated pieces are oriented at different angles. Adjacent pieces of foil material and as an adhesive for mounting a solar cell array to a flexible substrate.

Official Gazette of the U.S. Patent Office
03 AUXILIARY SYSTEMS

are bonded by heating in a hydrogen atmosphere and then cutting the stack in planes perpendicular to the foils.

Official Gazette of the U.S. Patent Office

reported that consists of a metallic substrate, a layer of bright metallic material carried on the substrate, and a solar thermal energy absorbing coating carried on the bright metallic material. A layer of zinc is interposed between the metal substrate and the layer of bright material, or the metallic substrate can be anodized for receiving the layer of bright metallic material. Also disclosed is the method for producing the coating which selectively absorbs solar thermal energy.

NASA

N74-19689# National Aeronautics and Space Administration. Pasadena Office. Calif.

STORAGE BATTERY COMPRISING NEGATIVE PLATES OF A WEDGE SHAPED CONFIGURATION Patent

An improved silver-zinc battery particularly suited for use in an environment where battery operation is subjected to multiple charge/discharge cycling over extended periods is described. The battery separator system, containing a highly absorbent material contiguous with the surfaces of the plates and multiple semi-permeable membranes interposed between the plates, is also characterized. Official Gazette of the U.S. Patent Office

N74-19700# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

A PANEL FOR SELECTIVELY ABSORBING SOLAR THERMAL ENERGY AND THE METHOD FOR MANUFACTURING THE PANEL Patent Application

A panel for selectively absorbing solar thermal energy is

N74-19702# National Aeronautics and Space Administration. Pasadena Office, Calif.

ELECTRIC POWER GENERATION SYSTEM DIRECTLY FROM LASER POWER Patent Application

A system is reported in which laser power is directly converted into electric power. Liquid cesium is ionized by a laser beam
with a collector spaced apart from the cesium to collect either the cesium ions or free electrons; thus, a potential difference between the collector and the cesium liquid is produced. NASA
04 BIOSCIENCES

Includes aerospace medicine, exobiology, radiation effects on biological systems, physiological and psychological factors. For related information see also: 05 Biotechnology.


A plant growth acceleration apparatus is reported wherein plants are grown in rotating beds driven in a planetary path about a primary axis so as to reduce the constraints of gravity upon the plants.

N74-15778 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. AUTOMATIC REAL-TIME PAIR-FEEDING SYSTEM FOR ANIMALS Patent

A pair feeding method and apparatus are provided for experimental animals wherein the amount of food consumed is immediately delivered to a normal or control animal so that there is a qualitative, quantitative and chronological correctness in the pair feeding of the two animals. This feeding mechanism delivers precisely measured amounts of food to a feeder. Circuitry is provided between master and slave feeders so that there is virtually no chance of a malfunction of the feeding apparatus, causing erratic results. Recording equipment is also provided so that an hourly record is kept of food delivery.

Official Gazette of the U.S. Patent Office
05 BIOTECHNOLOGY

Includes life support systems, human engineering; protective clothing and equipment; crew training and evaluation, and piloting. For related information see also: 04 Biosciences.

REMOTE MANIPULATOR SYSTEM Patent Application
D. A. Kugath, Herman T. Blaise, and Dan H. Dane, inventors (to NASA) Filed 11 Oct. 1973 28 p
(NASA-Case-MFS-22022-1; US-Patent-AppI-SN-405341) Avail:
NTIS HC $3.50 CSCL 05H

A master-slave manipulator system with two master units is described. The system is controlled by the two arms and hands of an operator and two corresponding slave units. Both the master and the slave units have a first arm rotatably mounted to the floor at 30 deg from the vertical, a second arm pivoted to it and mounted for rotation, and a third arm pivoted to the second arm. The slave has a pivotally and rotatably mounted gripper unit while the master has a pivotally mounted unit with manual switch controls. The servomechanism system includes a solid state control circuit, and flat, helically wound, internal ribbons of wires.

ORTHOTIC ARM JOINT Patent Application
Dan H. Dane, inventor (to NASA) Filed 4 Oct. 1973 14 p
(NASA-Case-MFS-21611-1; US-Patent-AppI-SN-403694) Avail:
NTIS HC $3.00 CSCL 05H

An improved orthopedic (orthotic) arm joint that can be used in various joints of mechanical arms is presented. The arm joint includes a worm, which is coupled to an electric motor for rotating a worm gear carried within a rotatable housing. The worm gear is supported on a thrust bearing and the rotatable housing is supported on a radial thrust bearing. A bolt extends through the housing, bearings, and worm gear for securing the device together. A potentiometer extends through the bolt, and is coupled to the rotatable housing for rotating, so as to produce an electrical signal indicating the angular position of the rotatable housing.

ULTRA-FLEXIBLE BIOMEDICAL ELECTRODES AND WIRES Patent Application
Salvadore A. Rositano, inventor (to NASA) Filed 13 Jul. 1973 19 p

ULTRA-FLEXIBLE BIOMEDICAL ELECTRODES AND WIRES Patent Application
Salvadore A. Rositano, inventor (to NASA) Filed 13 Jul. 1973 19 p
A flexible, stretchable biomedical electrode and wire connector which is designed for use by physicians, medical technicians and researchers to connect an electric instrument to the body is described. The electrode and wire connector comprise a soft flexible elastomer which has been loaded with a conductive metallic powder to render it conductive. An important variation of the invention includes an insulating layer over the back and face of the electrode, the face insulation having one or more apertures therein which may be filled with conducting jelly for connecting the electrode to a body.

A tachometer is described which instantaneously measures heart rate. During the two intervals between three succeeding heart beats, the electronic system: (1) measures the interval by counting cycles from a fixed frequency source occurring between the two beats; and (2) computes heart rate during the interval between the next two beats by counting the number of times that the interval count must be counted to zero in order to equal a total count of sixty times (to convert to beats per minute) the frequency of the fixed frequency source.

A dispenser particularly suited for use in dispensing potable water into food and beverage reconstitution bags is described. The dispenser is characterized by an expansible chamber, selectively adjustable stop means for varying the maximum dimensions, a rotary valve, and a linear valve coupled in a cooperating relation for delivering potable water to and from the chamber.

A portable miniature ultrasonic transducer positioning apparatus is described having a transducer receiving sleeve coupled to a pair of orthogonally orientated, independently pivotable yokes. The yokes are pivotally mounted to a base member the under surface of which is fitted with a non-skid rubber cap. A pair of potentiometers are coupled to the axes of the yokes and to a dual meter sleeve position indicator for indicating the angular position of a probe slidably fitted in the sleeves. An oscilloscope or similar signal display device is coupled to the probe for providing signal readout from the probe for use in ultrasonic cardiology oscilloscope studies. 

NASA


A cyclically operable fluid dispenser for use in dispensing precisely measured charges of potable water aboard spacecraft is described. The dispenser is characterized by (1) a sealed housing adapted to be held within a crewman's palm and coupled with a pressurized source of potable water; (2) a dispensing jet projected from the housing and configured to be received within a crewman's lips; (3) an expandable measuring chamber for measuring charges of drinking water received from the source; (4) and a dispenser actuator including a lever extended from the housing to be digitated for initiating operational cycles, whereby precisely measured charges of potable water selectively are delivered for drinking purposes in a weightless environment.

Official Gazette of the U.S. Patent Office

N74-14846* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

MODIFICATION OF ONE MAN LIFE RAFT Patent

A one man inflatable life raft is described. The raft has an inflatable tube perimetrically bounding the occupant receiving space with a flexible floor member. A zippered opening in the floor allows entry and facilitates the use of a constant diameter tube. An airtight fabric bulkhead divides the peripheral tube longitudinally into inflatable tube sections, where if either tube section were punctured, the bulkhead would move into the punctured section to substitute for the punctured wall portion and maintain the inflatable volume of the tube. The floor member is attached to the central portion of the tube wall so that either side of the raft can be the up side.

Official Gazette of the U.S. Patent Office

N74-17858* National Aeronautics and Space Administration. Pasadena Office, Calif.

AN IMPROVED HEAT STERILIZABLE PATIENT VENTILATOR Patent Application

A modified heat sterilizable patient ventilator is disclosed. The ventilator is characterized by a ported center body, a shell formed of heat sterilizable material mounted on the center body and defining a hermetically sealed reservoir for confining under positive pressure a mixture of bacteria free gas, and a pneumatic circuit including an oxygen delivery jet coupled with an absolute filtration system for delivering a bacteria free mixture of gases to the reservoir.

NASA


METERING GUN FOR DISPENSING PRECISELY MEASURED CHARGES OF FLUID Patent

Official Gazette of the U.S. Patent Office
SHOULDER HARNESS AND LAP BELT RESTRAINT SYSTEM
Patent Application
A shoulder harness and lap belt restraint system are reported wherein the lap belt is combined with the shoulder harness in such a manner that a single fastening suffices to fasten both the shoulder strap and the lap belt. NASA

VISUAL EXAMINATION APPARATUS Patent Application
Visual examination apparatus and, more particularly, an automated visual sensitivity tester for examining the eyes of a human being to determine visual field sensitivity and blind spot size, shape, and position is described. A projection system is provided for projecting dynamic visual stimuli onto a viewing lens. The projection system also includes several photocells for developing electrical signals commensurate with the projected visual stimuli. Response signals provided by a hand-held switch and the electrical signals from photocells are fed into a signal conditioner and then into a control unit which drives an X-Y recorder to provide a record of both stimulus and response signals. NASA

REDUCED GRAVITY FECAL COLLECTOR SEAT AND URINAL Patent
A waste collection system for use in a reduced gravity including a seat having an opening centrally located with a pair of opposed depressed valleys on opposite sides of said opening for accommodating the ischial tuberosities of a user. The seat has contoured surfaces for providing support of the user's body and includes a prominent ridge towards the rear, which provides forward-aft positioning cue to the user. A curved recess is provided adjacent the forward portion of the seat for accommodating a tubular urinal having an enlarged open mouth. Official Gazette of the U.S. Patent Office

ULTRASONIC BIOMEDICAL MEASURING AND RECORDING APPARATUS Patent
A train of ultrasonic pulses is beamed into the body of an animal. Organs intercepted by the beam reflect echo pulses following each transmitted pulse. An electronic gate with a variable width and a variable time delay relative to the transmitted pulse is utilized for selecting echoes derived from other organs or portions of organs. The integral of the echo signals received within the first half of the gate period is subtracted from a corresponding integral of the echo signal received during the second half of the gate to derive an error signal for controlling the time delay of the gate. In this manner, the selected echo signal is always maintained in the center of the gate.

Official Gazette of the U.S. Patent Office

An apparatus is described for the measurement of metabolic rate and breathing dynamics in which inhaled and exhaled breath are sensed by sealed, piston-displacement type spirometers. These spirometers electrically measure the volume of inhaled and exhaled breath. A mass spectrometer analyzes simultaneously for oxygen, carbon dioxide, nitrogen and water vapor. Computation circuits are responsive to the outputs of the spirometers, mass spectrometer, temperature, pressure and timing signals and compute oxygen consumption, carbon dioxide production, minute volume and respiratory exchange ratio. A selective indicator provides for read-out of these data at predetermined cyclic intervals.

Official Gazette of the U.S. Patent Office
06 CHEMISTRY

Includes chemical analysis and identification (e.g., spectroscopy). For applications see: 17 Materials, Metallic; 18 Materials, Nonmetallic; and 27 Propellants.


Aromatic azines for the preparation of poly(diarylsiloxane) arylamines are reported. These polymers are made by condensing a multihydroxylated aryl azine monomer with a bis(anilino)diaryl or dialkyl silane monomer. Because of their particular chemical composition, the resulting polymers have an inherent stability with respect to ultraviolet light and high temperatures. The stabilization occurs at wavelengths including those shorter than those found on earth, both in the absence and presence of oxygen, so that the polymers are particularly useful for application in extraterrestrial space. NASA


The preparation of chemically resistant and flame retardant foams from polyfunctional aromatic carboxylic acid derivatives and organic polyisocyanates is outlined. It was found that polyimide foams of reproducible density above 1 lb./ft. and below 8 lbs./cu. ft. can be obtained by employing in the reaction of least 2% by weight of siloxane-glycol copolymer as a surfactant which acts as a specific density control agent. Polyimide foams into which reinforcing fibers such as silicon dioxide and carbon fibers may be incorporated were also produced. NASA


A catalyst cartridge, for use in a carbon dioxide reducing apparatus in a life support system for space vehicles, is described. The catalyst cartridge includes an inner perforated metal wall, an outer perforated wall space outwardly from the inner wall, a base plate closing one end of the cartridge, and a cover plate closing the other end of the cartridge. The cover plate has a central aperture through which a supply line with a heater feeds a gaseous reaction mixture comprising hydrogen and carbon dioxide at a temperature from about 1000 to about 1400 F. The outer surfaces of the internal wall and the inner surfaces of the outer wall are lined with a ceramic fiber batteting material of sufficient thickness to prevent carbon formed in the reaction from passing through it. The portion of the surfaces of the base and cover plates defined within the inner and outer walls are also lined with ceramic batteting. The heated reaction mixture passes outwardly through the inner perforated wall and ceramic batteting and over the catalyst. The solid carbon product forms is retained within the enclosure containing the catalyst. The solid carbon product formed is retained within the enclosure containing the catalyst. The water vapor and unreacted carbon dioxide and any intermediate products pass through the perforations of the outer wall. Official Gazette of the U.S. Patent Office


Lightweight, fire resistant foams have been developed through the modification of conventional neoprene-isocyanate foams by the addition of an alkyl halide polymer. Extensive tests have shown that the modified/neoprene-isocyanate foams are much superior in heat protection properties than the foams heretofore employed both for ballistic and ablative purposes. Official Gazette of the U.S. Patent Office
A method and apparatus for thermally growing stable silicon dioxide layers on silicon is disclosed. A previously etched and baked silicon nitride tube placed in a furnace is used to grow the silicon dioxide. First, pure oxygen is allowed to flow through the tube to initially coat the inside surface of the tube with a thin layer of silicon dioxide. After the tube is coated with the thin layer of silicon dioxide, the silicon is oxidized thermally in a normal fashion. If the tube becomes contaminated, the silicon dioxide is etched off thereby exposing clean silicon nitride and then the inside of the tube is recoated with silicon dioxide. As is disclosed, the silicon nitride tube can also be used as the ambient for the pyrolytic decomposition of silane and ammonia to form thin layers of clean silicon nitride.

A method of preparing aromatic polyimides having uniquely low softening temperatures is described. By using meta-substituted aromatic diamines alone in homopolyimide preparation by reacting them with aromatic dianhydrides, homopolyimides are recoverable. They also are thermoplastic at such unusually low temperatures as to make them moldable and otherwise processible under more favorable conditions.

An improved system is described for reproducibly analyzing, both qualitatively and quantitatively, trace amounts of a large number of organic volatiles existing in a gas sample. Applications include: (1) analyzing the headspace gas of body fluids and comparing a profile of the organic volatiles with standard profiles so that flavor and aroma can be monitored and controlled, and (2) similar analysis for determining the organic pollutants in samples of water and air. The system includes a means (sample trap) for capturing and enriching the organic volatiles, an injector port for directly injecting the entrapped organic volatiles to a cryogenic precolumn to provide a sharply defined plug, and a capillary separating column. Various detectors may be utilized to identify the separated volatiles.
07 COMMUNICATIONS

Includes communications equipment and techniques, noise; radio and communications blackout; modulation telemetry; tracking radar and optical observation; and wave propagation. For basic research see: 23 Physics, General; and 21 Navigation.


METHOD AND APPARATUS FOR A SINGLE CHANNEL DIGITAL COMMUNICATIONS SYSTEM Patent
Lucien A. Couvillon, Jr., Christopher Carl, Richard M. Goldestein, Edward C. Posener, and Richard R. Green, inventors (to NASA) varied composition. Results showed clearly the exhaust reactivity to increase with increasing levels of polyalkylbenzenes in the fuel. For the purposes of the study, had it been possible, fuel composition should have been defined and expressed in terms of component groups such that the potential for exhaust reactivity would be the same within each group and different from group to group. Statistical analysis of the mass emissions data showed significant car and fuel effects on hydrocarbon, carbon monoxide, nitric oxide, total aldehydes, and formaldehyde emission levels and on total photochemical reactivity. Correlations were found between mass emission parameters and fuel composition. (Modified author abstract) NASA

LOW LOSS DICHROIC PLATE Patent

A low loss dichroic plate is disclosed for passing radiation within a particular frequency band and reflecting radiation outside of that frequency band. The dichroic plate is comprised of a configuration of dipole elements defined by slots formed in a conductive plate. The slots are dimensioned so as to pass radiation of a selected frequency and are shaped so as to minimize the relationship between that frequency and the tilt angle of the plate relative to the direction of radiation. The slots are arranged so as to minimize signal power loss due to cross polarization effects.


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ADJUSTABLE FREQUENCY RESPONSE MICROPHONE Patent Application

A frequency adjustable capacitance microphone is presented along with its design and construction costs. Operational reliability and adjustment accuracy are included. NASA
An apparatus is described for recording a data input on a thermally processible storage medium. A light source, whose intensity is modulated in response to the incoming data input, generates a raster in conformance with incoming timing/control signals so as to expose a latent image of the input information on the storage medium. A rotating drum in conjunction with an incrementally driven lens carriage associated with the laser optical system provides the raster generation. The drum is automatically loaded with the storage medium from a supply means and automatically unloaded to a thermal processor upon completion of recording. The latent image is processed by the controlled application of heat so as to produce an actual displayable image corresponding to the data input at the output of the apparatus.

An illustrative embodiment of the invention includes apparatus which simultaneously produces both direct delta modulation and pulse code modulation. An input signal, after amplification, is supplied to a window comparator which supplies a polarity control signal to gate the output of a clock to the appropriate input of a binary up-down counter. The control signals provide direct delta modulation while the up-down counter output provides pulse code modulation.

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An improved digital transmitter for transmitting serial pulse code modulation (pcm) data at high bit rates over a transmission line is described. When not transmitting, the transmitter features a high output impedance which prevents the transmitter from loading the transmission line. The pcm input is supplied to a logic control circuit which produces two discrete logic level signals which are supplied to an amplifier. The amplifier, which is transformer coupled to the output isolation circuitry, converts the discrete logic level signals to two high current level, ground isolated signals in the secondary windings of the coupling transformer. The latter signals are employed as inputs to the isolation circuitry which includes two series transistor pairs operating into a hybrid transformer functioning to isolate the transmitter circuitry from the transmission line. An effective increased amplitude, balanced, differential output signal is produced by the transmitter from the serial pcm input data to provide an improved transmitted signal on the transmission line.

A transmission system for asynchronously communicating binary data from a plurality of satellite sampling locations to a central location over a single channel, unidirectional communication line is presented. The novelty of the invention appears to reside in the employment of dual satellite message frames from each one of a plurality of satellite locations. The pairs of frames are asynchronously multiplexed with other frame pairs on a single, unidirectional transmission line connected to a remote location. Employment of these dual message frames in an asynchronous environment provides sufficient information at the remote location to guarantee synchronization and demultiplexing by signals derived from the received data frames. The techniques of this invention provide simplified and reliable circuitry at the plurality of satellite locations.


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bit signals are simultaneously supplied to two channels which 
alternately receive a generated, phase coded bit signal representa-
tive of a binary digit, and the generated bit signal is multiplied 
with the incoming bit signals. The multiplied signals are 
respectively integrated and held. When the incoming signal is 
properly phase locked with the generated bit signal, each channel 
will produce an integrated value which increases (either positively 
or negatively) over the entire bit period of the generated bit 
signal. The channels are respectively sampled at the end of one 
bit period and at the beginning of the following bit period. The 
sampled signals are supplied to a bit lock detector.

Official Gazette of the U.S. Patent Office

A bit synchronizer for a split phase PCM transmission is 
reported that includes three loop circuits which receive incoming 
phase coded PCM signals. In the first loop, called a Q-loop, a 
generated, phase coded, PCM signal is multiplied with the 
incoming signals, and the frequency and phase of the generated 
signal are nulled to that of the incoming subcarrier signal. In 
the second loop, called a B-loop, a circuit multiplies a generated 
signal with incoming signals to nulU the phase of the generated 
signal in a bit phase locked relationship to the incoming signal. 
In a third loop, called the I-loop, a phase coded PCM signal is 
multiplied with the incoming signals for decoding the bit 
information from the PCM signal. A counter means is used for 
timing of the generated signals and timing of sample intervals 
for each bit period. 

Official Gazette of the U.S. Patent Office

A multiple phase modulated carrier tracking loop for use in 
a frequency shift keying system is described in which carrier 
tracking efficiency is improved by making use of the decision 
signals made on the data phase transmitted in each T-second 
interval. The decision signal is used to produce a pair of 
decision-feedback quadrature signals for enhancing the loop's 
performance in developing a loop phase error signal. 

Official Gazette of the U.S. Patent Office
A rotating raster generator is provided which enables display of a television raster at any arbitrary roll angle. The generator includes four integrator circuits each of which receives a first voltage input corresponding to the sine or cosine of the desired roll angle and a second input comprising conventional horizontal or vertical sync pulses. The integrator circuits each comprise an operational amplifier and a capacitor connected for producing a ramp output having a rate of change proportional to the roll angle input, an electronic switch responsive to the sync input for resetting the integrator, and a summer that adds the ramp output of the integrator to the roll angle input so as to provide a zero-centered deflection control voltage.
08 COMPUTERS

Includes computer operation and programming; and data processing. For applications, see specific categories. For related information see also: 19 Mathematics

DIGITAL SECOND-ORDER PHASE-LOCKED LOOP Patent
Jack K. Holes, Christopher Carl, and Carl R. Tegnelia, inventors
Supersedes N73-12192 (11 - 03, p 0270) Sponsored by NASA
(NASA-Case-NPO-11905-1; US-Patent-3,772,272;

A digital second-order phase-locked loop is disclosed in which a counter driven by a stable clock pulse source is used to generate a reference waveform of the same frequency as an incoming waveform, and to sample the incoming waveform at zero-crossover points. The samples are converted to digital form and accumulated over M cycles, reversing the sign of every second sample. After every M cycles, the accumulated value of samples is hard limited to a value $\text{SGN} = + 1$ or $-1$ and multiplied by a value $\Delta = \frac{n}{2}$ equal to a number of $n$ fractions of a cycle. An error signal is used to advance or retard the counter according to the sign of the error by an amount equal to the sum.

Digital Second-Order Phase-Locked Loop

Official Gazette of the U.S. Patent Office

N74-14920* National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
ADAPTIVE VOTING COMPUTER SYSTEM Patent
Louis J. Koczela (Autonetics, Anaheim, Calif.) and Donald S. Wilgus, inventors
Supersedes N72-21206 (10 - 12, p 1581) Sponsored by NASA
(NASA-Case-MSC-13932-1; US-Patent-3,783,250;

A computer system is reported that uses adaptive voting to tolerate failures and operates in a fail-operational, fail-safe manner. Each of four computers is individually connected to one of four external input/output (I/O) busses which interface with external subsystems. Each computer is connected to receive input data and commands from the other three computers and to furnish output data commands to the other three computers. An adaptive control apparatus including a voter-comparator-switch (VCS) is provided for each computer to receive signals from each of the computers and permits adaptive voting among the computers to permit the fail-operational, fail-safe operation.

Adaptive Voting Computer System

Official Gazette of the U.S. Patent Office

N74-17911* National Aeronautics and Space Administration.
Pasadena Office, Calif.
SHARED MEMORY FOR A FAULT-TOLERANT COMPUTER Patent Application
George C. Gilley, inventor (to NASA) (JPL) Filed 31 Aug. 1973
22 p (Contract NAS7-100)

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Shared Memory for a Fault-Tolerant Computer

Official Gazette of the U.S. Patent Office

conditioning and scanning steps are operated repetitively at high speed using conventional television camera scan, sync, and power supply circuitry to provide a low cost data storage system.
A system for sharing a memory in a fault-tolerant computer is described. The memory is under the direct control and monitoring of error detecting and error diagnostic units in the fault-tolerant computer. This computer, for example, verifies that data to and from the memory is legally encoded and verifies that words read from the memory at a desired address are, in fact, actually delivered from that desired address. The invention provides the means for a second processor, which is independent of the direct control and monitoring of the error checking and diagnostic units of the fault-tolerant computer, to share the memory of the fault-tolerant computer and includes circuitry to verify that: (1) The processor has properly accessed a desired memory location in the memory. (2) A data word read out from the memory is properly coded. (3) No inactive memory was erroneously outputting data onto the shared memory bus.
09 ELECTRONIC EQUIPMENT

Includes electronic test equipment and maintainability; component parts, e.g., electron tubes, tunnel diodes, transistors, integrated circuitry; microminiaturization. For basic research, see: 10 Electronics. For related information see also: 07 Communications and 21 Navigation.


CONTROLLED OSCILLATOR SYSTEM WITH A TIME DEPENDENT OUTPUT FREQUENCY Patent

A controlled oscillator system is presented for providing an output with a frequency which changes with respect to time and with a phase which is within established phase error limits. The system includes a frequency synthesizer with a symmetrical search oscillator, capable of tuning the output with a range of + or - 100 Hz about any fixed frequency to which the synthesizer is set. For a tuning range of 200 Hz (± 100 Hz) 4 MHz (from 1 MHz to 5 MHz) is provided. A counter counts continuously the expanded output cycles and at each of fixed sampling intervals, for every 0.1 second, the count or number accumulated in the counter is read out. The sample number is compared with a theoretical number which should be present in the counter at the particular sampling instant for proper synthesizer's output frequency and phase.

Official Gazette of the U.S. Patent Office


MILLIMETER WAVE PUMPED PARAMETRIC AMPLIFIER Patent Application

A millimeter wave parametric amplifier structure and a varactor diode mounting structure are presented including a housing with a pump frequency waveguiding channel and an intersecting signal frequency transmission line. The transmission line has a center conductor portion which protrudes into the pump channel. A portion of the housing forms the outer conductor of the transmission line. A pair of uncased varactor diode chips within the channel are stacked and connected in series across the waveguiding channel and are connected in parallel with respect to the inner and outer conductors of the signal transmission line. An adjustable stub means protrudes into the waveguiding channel adjacent to the stacked varactor diode chips and defines a capacitive gap across the channel for resonating the diode chips at an idler frequency. The stub means is located close to the stacked diode chips to provide a short return path for idler current generated by the diodes.

Official Gazette of the U.S. Patent Office

N74-10195* National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

ELECTRON BEAM CONTROLLER Patent

An electron beam device which extracts energy from an electron beam before the electrons of the beam are captured by a collector apparatus is described. The device produces refocusing of a spent electron beam by minimizing transverse

N74-10202* National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.

LOW SPEED PHASELOCK SPEED CONTROL SYSTEM Patent Application

Official Gazette of the U.S. Patent Office
A phaselock speed control system is reported that provides extremely accurate speed control, particularly at low speeds, of a brushless dc motor. The overall speed control system includes a phase comparator which compares a reference frequency signal with an encoder frequency signal. An integrator/converter unit converts the output of the phase comparator into an analog error voltage which is compensated and biased to derive a bi-directional error signal for further combination with the output from an overspeed control circuit in an operational amplifier to develop the torque polarity and control signal.


A closed loop regulated dc-to-dc converter employing an unregulated two winding inductive energy storage converter is provided by using a magnetically coupled multivibrator acting as duty cycle generator to drive the converter. The multivibrator is comprised of two transistor switches and a saturable transformer. The output of the converter is compared with a reference in a comparator which transmits a binary zero until the output exceeds the reference. When the output exceeds the reference, the binary output of the comparator drives transistor switches to turn the multivibrator off. The multivibrator is unbalanced so that a predetermined transistor will always turn on first when the binary feedback signal becomes zero.

Official Gazette of the U.S. Patent Office
An automatic vehicle detection system is disclosed, in which each vehicle whose location is to be detected carries active means which interact with passive elements at each location to be identified. The passive elements comprise a plurality of passive loops arranged in a sequence along the travel direction. Each of the loops is tuned to a chosen frequency so that the sequence of the frequencies defines the location code. As the vehicle traverses the sequence of the loops as it passes over each loop, signals only at the frequency of the loop being passed over are coupled from a vehicle transmitter to a vehicle receiver. The frequencies of the received signals in the receiver produce outputs which together represent a code of the traversed location. The code location is defined by a painted pattern which reflects light to a vehicle carried detector whose output is used to derive the code defined by the pattern.

N74-12913* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH POWERED ARC ELECTRODES Patent

Nonconsumable metal electric arc electrodes are described capable of being operated in a variety of gases at various pressures, currents, and powers. The cathode has a circular annulus tip to spread the emission area for improved cooling.

Official Gazette of the U.S. Patent Office

A VARIABLE FREQUENCY INVERTER FOR AC INDUCTION MOTORS WITH TORQUE, SPEED AND BRAKING CONTROL Patent Application

A variable frequency inverter is described for driving an ac induction motor which varies the frequency and voltage to the motor windings in response to varying torque requirements for the motor so that the applied voltage amplitude and frequency are of optimal value for any motor load and speed requirement. The slip frequency of the motor is caused to vary proportionally to the torque and feedback is provided so that the most efficient operating voltage is applied to the motor. Winding current surge is limited and a controlled negative slip causes motor braking and return of load energy to a dc power source.

NASA
A cross-wound electrical heater comprising two resistance coils wound together with opposite pitches electrically connected at their crossing points, is reported. Each element is supplied by a separate power supply of the same magnitude, and each power supply is isolated from reverse currents by a diode. Failure of one of the windings results in only a moderate change in output power.

A full-wave modulator-demodulator apparatus is described including an operational amplifier having a first input terminal coupled to a circuit input terminal, and a second input terminal alternately coupled to the circuit input terminal. The operational amplifier is alternately switched between a non-inverting mode and an inverting mode. The switching circuit includes three field-effect transistors operatively associated to provide the desired switching function in response to an alternating reference signal of the same frequency as an AC input signal applied to the circuit input terminal.

Stabilizing the phase delay of signals passing through a pressurizable coaxial cable is disclosed. Signals from an appropriate source at a selected frequency, e.g., 100 MHz, are sent through the controlled cable from a first cable end to a second cable end which, electrically, is open or heavily-mismatched at 100 MHz. Thereat, the phase difference between the reflected-back signals is proportional to the input signal frequency.

Disclosed is a system for an orbital antenna which is operated at a synchronous altitude to scan an area of a celestial body. The orbiting antenna has scanning capabilities to determine the location of a ground based beacon or transmitter relative to a central surface location at a short time after activation of the beacon. The purpose of this system is to provide a means of determining the position of ground based beacons relative to a central location within seconds after activation of the beacon. Thus, rapid location of vehicles in distress such as ships at sea, auto wrecks, airplane crashes, or any other basic alarm function can be quickly located.

Stabilizing the phase delay of signals passing through a pressurizable coaxial cable is disclosed. Signals from an appropriate source at a selected frequency, e.g., 100 MHz, are sent through the controlled cable from a first cable end to a second cable end which, electrically, is open or heavily-mismatched at 100 MHz. Thereby reflecting 100 MHz signals back to the first cable end. Thereat, the phase difference between the reflected-back signals is proportional to the input signal frequency.
and the signals from the source is detected by a phase detector. The output of the latter is used to control the flow of gas to or from the cable, thereby controlling the cable pressure, which in turn affects the cable phase delay.

Banded Transformer Cores Patent

A banded transformer core formed by positioning a pair of mated, similar core halves on a supporting pedestal. The core halves are encircled with a strap, selectively applying tension whereby a compressive force is applied to the core edge for reducing the innate air gap. A dc magnetic field is employed in supporting the core halves during initial phases of the banding operation, while an ac magnetic field subsequently is employed for detecting dimension changes occurring in the air gaps as tension is applied to the strap.

Overvoltage Protection Network Patent
Joseph M. Cembra, inventor (to NASA) Issued 5 Mar. 1974 5 p Filed 29 Nov. 1972 Supersedes N73-29124 (11 - 20, p 2380)

Electrical equipment to be protected from overvoltage is connected with a possible source of overvoltage via an input conductor. A fuse is connected in series with the input conductor. A spark gap is connected between the input conductor and ground for conducting the overvoltage current to ground and for blowing the fuse to open the circuit to the electrical equipment. A pulse attenuator network is provided between the spark gap and the electrical equipment to be protected for attenuating the pulse of energy passing through the spark gap prior to blowing of the fuse. The pulse attenuator network includes additional shunt spark gaps, series inductance, and a series connection of a twisted shielded pair of conductors having low-voltage insulation.

Symmetrical Odd-Modulus Frequency Divider Patent Application
Alexander Engel, inventor (to NASA) (JPL) Filed 12 Mar. 1974 9 p
A frequency divider arrangement is reported that can be used for division by an odd number and which provides a symmetrical waveform output. The value of N is determined for any odd modulus by which it is desired to divide a frequency and the divide by 2^N counter is then obtained as well as an exclusive OR gate to receive one input signal from the source.

A piezoelectric device, particularly adapted for use as an electrostatic relay, is described. Each bimorph includes a stacked arrangement of piezoelectric plates and electrodes. First ends of the bimorphs of each bimorph pair are rigidly connected. The pairs of bimorphs are mounted so that all of them lie in parallel planes and have aligned longitudinal axes. The bimorph pairs are electrically connected so that the bimorphs of the two pairs are oppositely polarized and deflect in opposite direction relative to the fixed support.

A high voltage dc stepping power supply for sampling a utilization device such as an electrostatic analyzer has a relatively fast settling time. The supply includes a waveform generator for deriving a low voltage staircase waveform that feeds a relatively long response time power supply. In the power supply, an ac voltage modulated by the staircase waveform is applied to a step-up transformer and thence to a voltage multiplier stack to form a high voltage. A constant dc source, applied to the input of the power supply, biases the voltage at the intermediate output terminal to be in excess of the predetermined multiple of the input voltage. A fast shunt regulator responsive to the input signal provides an output.

A resonant waveguide Stark cell is described suitable for use in a Stark-modulated microwave spectrometer. The cell is constructed from a short length of waveguide. A Stark electrode, is located inside the waveguide parallel to the broad face of the guide and insulated with narrow teflon strips. A reflector with a small coupling iris at its center is located at one end of the cell. This small coupling iris is for passing microwave energy into and out of the cell. At the other end of the cell there is an adjustable waveguide short, making the small Stark cell into a tunable cavity. Means are provided for maintaining a gas-tight compartment within the cell, and ports are provided for the introduction of the gas.

A rapid pulsing, high intensity, incoherent light is produced by selectively energizing a plurality of discharge lamps with a triggering circuit. Each lamp is connected to a capacitor, and a
power supply is electrically connected to all but one of the capacitors. This last named capacitor is electrically connected to a discharge lamp which is connected to the triggering circuit.

Official Gazette of the U.S. Patent Office

N74-20860* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

AMPLITUDE STEERED ARRAY Patent

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

Official Gazette of the U.S. Patent Office

N74-20862* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ULTRA-STABLE OSCILLATOR WITH COMPLEMENTARY TRANSISTORS Patent

A high frequency oscillator, having both good short and long term stability, is formed by including a piezoelectric crystal in the base circuit of a first bi-polar transistor circuit, the bi-polar transistor itself operated below its transitional frequency and having its emitter load chosen so that the input impedance, looking into the base thereof, exhibits a negative resistance in parallel with a capacitive reactance. Combined with this basic circuit is an auxiliary, complementary, second bi-polar transistor circuit of the same form with the piezoelectric crystal being common to both circuits. By this configuration small changes in quiescent current are substantially cancelled by opposite variations in the second bi-polar transistor circuit, thereby achieving from the oscillator a signal having its frequency of oscillation stable over long time periods as well as short time periods.

Official Gazette of the U.S. Patent Office

N74-20861* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ROTARY SOLENOID SHUTTER DRIVE ASSEMBLY AND ROTARY INERTIA DAMPER AND STOP PLATE ASSEMBLY Patent

A camera shutter assembly composed of a pair of superposed opaque planar shutter blades, each having an aperture and being arranged for reciprocal linear movement is disclosed. A pair of rotary solenoids, each connected to one of the blades by a linkage and arranged to be actuated separately at a predetermined interval is provided. An inertia damper and stop plate is built into each solenoid to prevent rebound.

Official Gazette of the U.S. Patent Office
HIGH EFFICIENCY MULTIFREQUENCY FEED Patent

Antenna systems and particularly compact and simple antenna feeds which can transmit and receive simultaneously in at least three frequency bands, each with high efficiency and polarization diversity are described. The feed system is applicable for frequency bands having nominal frequency bands with the ratio 1:4:6. By way of example, satellite communications telemetry bands operate in frequency bands 0.8 - 1.0 GHz, 3.7 - 4.2 GHz and 5.9 - 6.4 GHz. In addition, the antenna system of the invention has monopulse capability for reception with circular or diverse polarization at frequency band 1.

TURNSTILE SLOT ANTENNA Patent

A turnstile slot antenna is disclosed, the antenna being for and integral with a spacecraft having a substantially cylindrical body portion. The antenna comprises a circumferential slot about the periphery of the spacecraft body portion with an annular wave guide cavity defining a radial transmission line disposed within the spacecraft body portion behind and in communication with the circumferential slot. Feed stubs and associated transmission apparatus are provided to excite the annular cavity in quadrature phase such that an omnidirectional, circularly polarized, rotating radiation pattern is generated. The antenna of the instant invention has utility both as a transmitting and receiving device, and ensures continuous telemetry and command coverage with the spacecraft.

Official Gazette of the U.S. Patent Office
10 ELECTRONICS

Includes circuit theory and feedback and control theory. For applications see: 09 Electronic Equipment. For related information see specific Physics categories:


A technique for extending the frequency range of a presettable digital divider is described. The conventional digital divider consists of several counter stages with the count of each stage compared to a preselected number. When the counts for all stages are equal to the preselected numbers, an output pulse is generated and all stages are reset. For high input frequencies, the least significant stage of the divider has to be reset in a very short time. This limits the frequency that can be handled by the conventional digital divider. This invention provides a technique in which the second least significant and higher stages are reset and the least significant stage is permitted to free-run. Hence, the time in which the reset operation can be performed is increased thereby extending the frequency range of the divider.


The system described provides protection for phase sensitive loads from being or remaining connected to ac power lines whenever a phase reversal occurs. It comprises a solid state phase detection Circuit, a dc power relay Circuit, an ac-to-dc converter for energizing the relay circuit, and a bistable four terminal transducer coupled between the phase detection circuit and the power relay circuit, for controlling both circuits.


A beam-lead integrated circuit package assembly including a beam-lead integrated circuit chip, a lead frame array bonded to projecting fingers of the chip, a rubber potting compound disposed around the chip, and an encapsulating molded plastic is described. The lead frame array is prepared by photographically printing a lead pattern on a base metal sheet, selectively etching to remove metal between leads, and plating with gold. Joining of the chip to the lead frame array is carried out by thermocompres-
A microwave, wireless, power transmission system is described in which the transmitted power level is adjusted to correspond with power required at a remote receiving station. Deviations in power load produce an antenna impedance mismatch causing variations in energy reflected by the power receiving antenna employed by the receiving station. The variations in reflected energy are sensed by a receiving antenna at the transmitting station and used to control the output power of a power transmitter.

Official Gazette of the U.S. Patent Office.
11 FACILITIES, RESEARCH AND SUPPORT

Includes airports; lunar and planetary bases including associated vehicles; ground support systems; related logistics; simulators; test facilities (e.g., rocket engine test stands, shock tubes, and wind tunnels); test ranges; and tracking stations.

N74-17968® National Aeronautics and Space Administration.
Langley Research Center, Langley Station, Va.

WIND TUNNEL MODEL AND METHOD Patent
Supersedes N72-27272 (10 - 18, p 2407)
US Patent Office CSCL 148

The design and development of a wind tunnel model equipped with pressure measuring devices are discussed. The pressure measuring orifices are integrally constructed in the wind tunnel model and do not contribute to distortions of the aerodynamic surface. The construction of a typical model is described and a drawing of the device is included.

P.N.F.

N74-18891® National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

TWO STAGE LIGHT GAS PLASMA PROJECTILE ACCELERATOR Patent Application
(NASA-Case-MFS-22287-1; US-Patent-Appi-SN-438147) Avail:
NTIS HC $4.00 CSCL 148

A device for accelerating a projectile to extremely high velocities, composed of a light gas accelerator to impart an initial high velocity to the projectile and a plasma accelerator and compressor receiving the moving projectile and accelerating it to higher velocities, is described. A capacitor bank is discharged into a plasma generator in timed relationship to the position of the projectile so that the moving plasma drags the projectile along with it. Projectile velocities in the order of 20 kilometers per second, the average meteoroid velocity, can be attained, whereby the accelerator finds particular utility in the field of meteoroid simulation.

NASA
12 FLUID MECHANICS

Includes boundary-layer flow; compressible flow; gas dynamics; hydrodynamics; and turbulence. For related information see also: 01 Aerodynamics; and 33 Thermodynamics and Combustion.

No abstracts in this subject category.
Includes aeronomy; upper and lower atmosphere studies; oceanography; cartography; and geodesy. For related information see also: 20 Meteorology; 29 Space Radiation; and 30 Space Sciences.

METHOD FOR OBTAINING OXYGEN FROM LUNAR OR SIMILAR SOIL Patent
William R. Downs, inventor (to NASA). Issued 20 Nov. 1973
p. 1467)
(NASA-Case-MSC-12408-1; US-Patent-3,773,913;
US Patent Office CSCL 038

Recovery of oxygen from soil containing metal oxides such as alumina, silica, calcia, magnesia, and ilmenite wherein the material containing the oxides is placed in a vessel and reacted with fluorine to provide oxygen and metal fluorides. The oxygen produced from the reaction is recovered and stored, after further purifying processes, and the metal fluorides are further reacted with potassium vapor to provide potassium fluoride and free metals. The potassium fluoride is then subjected to electrolysis whereby the potassium and fluorine are separated and are recycled for further use in the system. Valuable free metals are recovered for other uses. Official Gazette of the U. S. Patent Office
INSTRUMENTATION AND PHOTOGRAPHY

Includes design, installation, and testing of instrumentation systems; gyroscopes; measuring instruments and gauges; recorders; transducers; aerial photography; and telescopes and cameras.

ULTRASONIC SCANNER FOR RADIAL AND FLAT PANELS Patent
An ultrasonic scanning mechanism is described that scans panels of honeycomb construction or with welded seams. It incorporates a device which by simple adjustment is adapted to scan either a flat panel or a radial panel. The supporting structure takes the form of a pair of spaced rails. An immersion tank is positioned between the rails and below their level. A work holder is mounted in the tank and is adapted to hold the flat or radial panel. A traveling bridge is movable along the rails and a carriage is mounted on the bridge.

N74-10420* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AUTOMATIC FOCUS CONTROL FOR FACSIMILE CAMERAS Patent Application
A movable stage contains two photodetectors for focusing as well as an imaging sensor. The imaging sensor produces the video data in the fashion standard to facsimile cameras. The two photodetectors are placed with one closer to the lens of the facsimile camera than the imaging sensor and with the other farther away. The movable stage is coupled to a linear motor which is driven from an error signal generated by the electronics. In order to insulate that the electrical signals at the output of the two photodetectors and the imaging sensor are in phase, electrical delays are connected to the outputs of the two photodetectors.

A METER FOR USE IN DETECTING TENSION IN STRAPS HAVING PREDETERMINED ELASTIC CHARACTERISTICS Patent Application
A description is given of a meter for use in detecting tension in fabric straps having predetermined elastic characteristics. The meter is characterized by a pair of elongated arms disposed in juxtaposed, substantial parallelism, a clevis interconnecting the arms for pivotal motion in a common plane about a common axis, and a pair of juxtaposed receivers integrally related with the first ends of the arms and supported for arcuate motion. The receivers are configured to receive and secure a pair of adjacent portions of a fabric strap, and a pressure-responsive device. The device is mounted at the second ends of the arms for measuring and indicating the magnitude of arcuate motion imparted to the receivers as tension-induced stretching of the strap occurs.

N74-10422* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
AUTOMATIC MICROBIAL TRANSFER DEVICE Patent Application
A description is given of a transfer device for rapidly transferring microorganisms from a liquid culture to a solid medium to form colonies. The device comprises a pair of gripping members which are adapted to grip the culture at opposite ends and to rotate a radial arm about a center line with a vacuum seal covering the culture. This provides for forming a cell culture having a desired pattern on a solid medium for providing an identification system to determine the origin of the culture and the type of microorganisms present.
An apparatus is disclosed for automatically transferring a predetermined amount of inoculated culture from a first container into a second container which has a sterile culture. The containers rest on the top of a pivoted support surface, where a horizontally disposed conduit connects them. The support surface is pivoted from its normal horizontal position by a solenoid which is activated under the control of an electrical timer. The solenoid is connected to a catch which may be disposed in two positions. When the solenoid is inactive, the catch is connected to the first end of the support surface to hold it in its normal horizontal position. When the solenoid is activated, the catch releases the support surface to a freely pivoting state. Upon release of the catch from the support surface, a weight disposed on the second end of the support surface tips the support surface from its normal horizontal position causing the predetermined volume of inoculated culture to flow into the second container.

A data-rate converter is disclosed comprising a rotatable data-storing drum with at least one fixed read/record head and a rotatable read/record head. The latter is rotatable in a circular path about the drum axis of rotation. The drum is positionable in any one of a plurality of axial positions with respect to the heads, so that at least one drum track is aligned with the fixed head in one drum position and with the rotatable head in another drum position. When a drum track is aligned with the fixed head, data may be recorded therein or read out therefrom at a rate which is a function of drum rotation, while when aligned with the rotatable head, data may be recorded or read out at a rate which is a function of the rates and directions of rotation of both the drum and the head.

The invention is directed to an apparatus for accurately calibrating ergometers so that the work rate produced during exercising on the ergometer can be determined accurately. The apparatus can be used to calibrate any ergometer that utilizes a rotating shaft. The apparatus includes a D.C. motor which is coupled directly to a shaft upon which peddles are normally mounted for rotating the ergometer. A torque sensor is coupled to the shaft which indicates the torque required to rotate the shaft. A tachometer is also coupled to the shaft for indicating the speed of rotation of the shaft. The signals from the torque sensor and the tachometer are fed into a power computer which computes the wattage being used by the motor. Thus, by comparing the output signal produced by the power computer with the output signal produced by the ergometer it can be determined if the ergometer is accurately calibrated.

**MONITORING ATMOSPHERIC POLLUTANTS WITH A HETERODYNE RADIOMETER TRANSMITTER-RECEIVER**


**ERGOMETER CALIBRATOR**


**IMAGE DATA RATE CONVERTER HAVING A FIXED HEAD AND A ROTATABLE-HEAD**

aperture, for focusing electrons passing through the specimen onto an image plane. A method for making the annular objective aperture using electron imaging, electrolytic deposition and ion etching techniques is given.

N74-13129* National Aeronautics and Space Administration, Flight Research Center, Edwards, Calif.
THREE-AXIS ADJUSTABLE LOADING STRUCTURE Patent
A three axis adjustable loading structure for testing the movable surfaces of aircraft by applying pressure, is described. The device has three electric drives where the wall angle, horizontal position, and vertical position of the test device can be rapidly and accurately positioned.

Official Gazette of the U.S. Patent Office
A micrometeorite impact sensing method and device for determining the characteristics and flux distribution of micrometeorites are discussed. The method consists of exposing to the micrometeorite environment a panel of sheet material of a thickness to be punctured by impacting micrometeorites and then scanning the panel with a scanner which produces an output representing the number and size of the puncture holes in the panel. After exposure, the panel is scanned for puncture holes by illuminating one side of the panel and retracting the panel into its storage container past a photoelectric scanner which produces an output representing the incident light.

Official Gazette of the U.S. Patent Office

A device is described for forming vee-notches in tensile test specimens comprising a vertically reciprocating, triangular, triple-edged cutting tool guided in a corresponding triangular slot. The specimen to be vee-notched is mounted on a carriage that is movable toward and away from the cutting tool. The specimen is precisely positioned on the carriage by tapered studs that extend into holes in the specimen and are used to expand spring collets against the wall of the holes.

Official Gazette of the U.S. Patent Office

**System for Calibrating Pressure Transducer**

Garland N. Rollins, inventor (to NASA) Issued 11 Dec. 1973
8 p Filed 30 Mar. 1972 Supersedes N72-28462 (10 - 19, p 2564)

A system for calibrating a pressure transducer which has a reference portion and an active portion is reported. A miniature selector valve is positioned immediately adjacent the pressure transducer. A reference pressure, known pressure, and unknown pressure can be selectively admitted to the active side of the pressure transducer by the selector valve to enable calibration of the transducer. A valve admits pressure to the selector valve which has a piston and floating piston arrangement which allows proper selection with very small linear movement.

Official Gazette of the U.S. Patent Office

**System for Generating Vee-Notches in Tensile Test Specimens**

Raymond A. Spier, inventor (to NASA) Issued 11 Dec. 1973
5 p Filed 23 Sep. 1971 Supersedes N72-11372 (10 - 02, p 0198)

A device is described for forming vee-notches in tensile test specimens comprising a vertically reciprocating, triangular, triple-edged cutting tool guided in a corresponding triangular slot. The specimen to be vee-notched is mounted on a carriage that is movable toward and away from the cutting tool. The specimen is precisely positioned on the carriage by tapered studs that extend into holes in the specimen and are used to expand spring collets against the wall of the holes.

Official Gazette of the U.S. Patent Office

**Test Equipment for Communications Systems**

Gabriel R. Wallace, William E. Salter (Sperry Rand Corp.), Glenn D. Weathers (Sperry Rand Corp.), and Sidney S. Gussow, inventors (to NASA) (Sperry Rand Corp.) Filed 28 Nov. 1973 18 p (Contract NAS8-21812)

A test set for communications systems is described. The set includes a pseudo-noise sequence generator that provides a test signal which is fed to a pair of signal channels. The first channel includes a spectrum shaping filter and a conditioning amplifier. The second channel includes a variable delay circuit, a spectrum shaping filter matched to the first filter, and an amplifier. The output of the first channel is applied to the system under test. The output of the system and the output of the second channel are compared to determine the degree of distortion suffered by the test signal due to the communications system.

**System for Measuring Drag Forces in a Turbulently Flowing Fluid**

Dah Yu Cheng, inventor (to NASA) Filed 12 Dec. 1973 19 p Sponsored by NASA
A system for measuring the drag forces in a turbulently flowing fluid is described. The system consists of a sensing apparatus for dynamically sensing the mainstream and the cross velocity components of the fluid, a transducer to provide two alternating current electrical output signals representative of the velocity components, and signal processors to process and shape the electrical signals. A numerical analysis of the performance of the sensors is provided.

A photovoltaic cell device with a trapezoidal barrier is described. An aluminum, magnesium, or tantalum base is vapor deposited on a quartz substrate. An oxide or nitride film of the base metal is produced as an insulator by reaction in a glow discharge plasma to a thickness of less than 100 Angstroms. A metal, preferably gold, conter-electrode is vapor deposited on the insulating layer. A bias generator of high impedances is used to set and shift or modulate the spectral response of the device.

A device for controlling the attitude of a spacecraft is described. The device consists of two light sensors on a spacecraft that are mounted beneath a baffle which divides the light from a light source such as the sun or a star. The divided light reflects off of two reflective surfaces onto the two light sensors. When the spacecraft assumes its normal attitude, the baffle divides the light source into two equal parts, causing the two light sensors to produce equal outputs. When the light is equally detected, the stabilizing system is disconnected. Deviations from the normal attitude cause unequal distribution of the light source and energize the stabilizing system.

A Mossbauer spectrometer with high efficiencies in both transmission and backscattering techniques is described. The device contains a sodium iodide crystal for detecting radiation caused by the Mossbauer effect, and two photomultipliers to collect the radiation detected by the crystal. When used in the transmission technique, the sample or scatterer is placed between the incident radiation source and the detector. When used in a backscattering technique, the detector is placed between the incident radiation source and the sample of scatterer such that the incident radiation will pass through a hole in the crystal and strike the sample. Diagrams of the instrument are provided.
INSTRUMENTATION AND PHOTOGRAPHY

N74-15082* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

IN SITU TRANSFER STANDARD FOR ULTRAHIGH VACUUM GAGE CALIBRATION Patent
Supersedes N72-28460 (10 - 19, p 2564)

A compact insitu calibration assembly, for ultrahigh vacuum gauges is described. The system depends on the repeatable generation of a specific gas pressure by the dissociation of a solid solution chemical compound when subjected to a given temperature. A precise temperature measurement is related to the pressure generated within the vacuum by the properties of the solid solution compound. This accurately establishes the gas pressure which in turn is used to calibrate a vacuum gauge. Also included is a metering orifice used in the calibration system and which is made movable to facilitate the degassing bakeout required in ultrahigh vacuum devices.

Official Gazette of the U.S. Patent Office

N74-15094* National Aeronautics and Space Administration. Pasadena Office, Calif.

HEATER-MIXER FOR STORED FLUIDS Patent

A fluid storage vessel for containing cryogenic fluids is described. The storage vessel contains an auxiliary chamber which is connected to the main container by a jet nozzle. The wall of the auxiliary vessel is heat cycled to produce a corresponding expansion and contraction of the fluid within the auxiliary chamber. This action causes heating and mixing of the stored fluid by means of jetting the expanded fluid to and from relative to the stored fluid contents of the vessel.

Official Gazette of the U.S. Patent Office

N74-15095* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

TEMPERATURE COMPENSATED DIGITAL INERTIAL SENSOR Patent

A circuit which maintains the inertial element of a gyroscope or accelerometer at a constant position by delivering pulses to a rebalancing motor is discussed. The circuit compensates for temperature changes by using a temperature sensor that varies the threshold of inertial element movement required to generate a rebalance pulse which reacts to changes in viscosity of the flotation fluid. The output of the temperature sensor also varies the output level of the current source to compensate for changes in the strength of the magnets of the rebalancing motor. The sensor also provides a small signal to the rebalance motor to provide a temperature dependent compensation for fixed drift or fixed bias.

Official Gazette of the U.S. Patent Office

N74-15096* National Aeronautics and Space Administration. Pasadena Office, Calif.

OPTICAL INSTRUMENTS Patent

48
A wide angle, low focal ratio, high resolution, catoptric, image plane scanner is described. The scanner includes the following features: (1) a reflective improvement on the Schmidt principle, (2) a polar line scanner in which all field elements are brought to and corrected on axis, and (3) a scanner arrangement in which the aperture stop of the system is imaged at the center of curvature of a spherical primary mirror. The system scans are a large radial angle and an extremely high rate of speed with relatively small scanning mirrors. Because the system is symmetrical about the optical axis, the obscuration is independent of the scan angle.

Official Gazette of the U.S. Patent Office

REAL TIME MOVING SCENE HOLOGRAPHIC CAMERA SYSTEM Patent
A holographic motion picture camera system producing resolution of front surface detail is described. The system utilizes a beam of coherent light and means for dividing the beam into a reference beam for direct transmission to a conventional movie camera and two reflection signal beams for transmission to the movie camera by reflection from the front side of a moving scene. The system is arranged so that critical parts of the system are positioned on the foci of a pair of interrelated, mathematically derived ellipses. The camera has the theoretical capability of producing motion picture holograms of projectiles moving at speeds as high as 900,000 cm/sec (about 21,450 mph).

Official Gazette of the U.S. Patent Office

N74-180096* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
METHOD OF FABRICATING AN ARTICLE WITH CAVITIES Patent
An article having a cavity with a thin bottom wall is provided by assembling a thin sheet, for example, a metal sheet, adjacent to the surface of a member having one or more apertures. A bonding adhesive is interposed between the thin sheet and the subadjacent member, and the thin sheet is subjected to a high fluid pressure. In order to prevent the differential pressure from being exerted against the thin sheet, the aperture is filled with a plug of solid material having a linear coefficient of thermal expansion higher than that of the member. When the assembly is subjected to pressure, the material is heated to a temperature such that its expansion exerts a pressure against the thin sheet thus reducing the differential pressure.

Official Gazette of the U.S. Patent Office

An infrared radiation detector including a cadmium sulfide platelet having a cathode formed on one of its ends and an anode formed on its other end is presented. The platelet is suitably doped such that stationary high-field domains are formed adjacent the cathode when based in the negative differential conductivity region. A negative potential is applied to the cathode such that a high-field domain is formed adjacent to the cathode. A potential measuring probe is located between the cathode and the anode at the edge of the high-field domain and means are provided for measuring the potential at the probe whereby this measurement is indicative of the infrared radiation striking the platelet.

Official Gazette of the U.S. Patent Office

N74-180088* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
HIGH FIELD CdS DETECTOR FOR INFRARED RADIATION Patent
N74-18090® National Aeronautics and Space Administration.
Pasadena Office, Calif.
INVERTER RATIO FAILURE DETECTOR Patent
Supersedes N73-23525 (11-14, p 1667) Sponsored by NASA

A failure detector which detects the failure of a dc to ac inverter is disclosed. The inverter under failureless conditions is characterized by a known linear relationship of its input and output voltages and by a known linear relationship of its input and output currents. The detector includes circuitry which is responsive to the detector's input and output voltages and which provides a failure-indicating signal only when the monitored output voltage is less by a selected factor, than the expected output voltage for the monitored input voltage, based on the known voltages' relationship. Similarly, the detector includes circuitry which is responsive to the input and output currents and provides a failure-indicating signal only when the input current exceeds by a selected factor the expected input current for the monitored output current based on the known currents' relationship.

N74-18092® National Aeronautics and Space Administration.
Pasadena Office, Calif.
WIDE ANGLE SUN SENSOR Patent Application
Larry L. Schumacher, inventor (to NASA) (JPL) Filed 28 Dec. 1973 18 p
(Contract NAS7-100)
(NASA-Case-NPO-13327-1; US-Patent-429437) Avail: NTIS HC $4.00 CSCL 14B

A single-axis sun sensor consists of a cylinder of an insulating material on which at least one pair of detectors is deposited on the cylinder circumference. At any time, only one-half 1973 cylinder is illuminated so that the total resistance of the two detectors is a constant. Due to the round surface on which the detectors are deposited, the sensor exhibits a linear wide angle of + or - 50 deg to within an accuracy of about 2 percent. By depositing several pairs of detectors on adjacent circumferences, sufficient redundancy is realized to provide high reliability. A two-axis sensor is provided by depositing detectors on the surface of a sphere along at least two orthogonal great circles. NASA

N74-18093® National Aeronautics and Space Administration.
Pasadena Office, Calif.
WIDE ANGLE SUN SENSOR Patent Application
Larry L. Schumacher, inventor (to NASA) (JPL) Filed 28 Dec. 1973 18 p
(Contract NAS7-100)
(NASA-Case-NPO-13327-1; US-Patent-429437) Avail: NTIS HC $4.00 CSCL 14B

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N74-18094® National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
ELECTROSTATIC ENTRAINED MATERIAL MEASUREMENT SYSTEM Patent Application
James E. Johnston, inventor (to NASA) Filed 12 Mar. 1974 12 p
(NASA-Case-MFS-22128-2; US-Patent-450536) Avail: NTIS HC $4.00 CSCL 14B

A device to measure the quantity of particulate material in air is described, comprising a tube and a vacuum source. The use of an electrostatic sensor in proximity to the tube provides a direct indication of the level of particulate matter. The device is uncomplicated and economical.

N74-18099® National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.
COMBINED DUAL SCATTER, LOCAL OSCILLATOR LASER DOPPLER VELOCIMETER Patent Application
Kenneth L. Orloff, inventor (to NASA) Filed 28 Mar. 1974 18 p
(NASA-Case-ARC-10642-1; US-Patent-446562) Avail: NTIS HC $4.00 CSCL 14B

A laser Doppler velocimeter is described which is capable of effectively measuring two different velocity components of a fluid simultaneously. Such a velocimeter includes a pair of coherent beams of laser light which are focused to an intersection point through which flow particles within the fluid whose velocity is to be measured. Both beams are plane polarized with the plane of polarization of one being rotated normally with respect to the other, with the result that the scattered radiation is separable into two different beams respectively corresponding to the two incident beams. Such scattered radiation is Doppler shifted by
the moving particles and is collected for conventionally providing a measurement of the velocity of any particle flowing through the intersection point on a path which is generally transverse.

N74-18100× National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR CALIBRATING AN IMAGE DISSECTOR TUBE Patent Application

The photosensitive screen of an image dissector tube is illuminated with a light pattern, having parallel opposite edges. A sweep signal is applied to the deflection coils of the tube, causing pattern scanning in a line perpendicular to the edges and generation of an output video pulse. The sweep signal is in the form of a time variable current whose average rate of change during the scan of the line is a constant and is dependent on a settable control circuit. Measurement of the output pulse width permits the setting of the slope control circuit to be changed if the width differs from a standard associated with the tube.

N74-18101× National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
FLOW MEASURING APPARATUS Patent Application

An apparatus for measuring the mass flow rates of the components comprising a binary gas mixture is described. This is accomplished by directing a binary fluid or gas through a fluidic humidity sensor and then through a calorimeter which increases the temperature of the flowing binary gas. Electrical signals provided by the fluidic humidity sensor, the flow calorimeter and a power supply which energizes or heats the calorimeter are operated upon in a predetermined manner to provide an output signal indicative of the mass flow rate of one of the binary gases, thus allowing the mass flow rate of the other gas to be determined since the total mass flow rate is previously calculated by the instrument and is the output of the operating module.

N74-19093× National Aeronautics and Space Administration.
Pasadena Office, Calif.
SERVO-CONTROLLED INTRAVITAL MICROSCOPE SYSTEM Patent Application

A microscope viewing system is provided which can maintain an in-focus enlarged view of a moving living body area. The system includes a beam splitter assembly behind the objective lens for directing light onto a viewing device and onto the targets of two video cameras, one target is located slightly in front of the image plane while the other target is located behind the image plane. A separate focus sensing circuit connected to each video camera includes a band pass filter for passing only the frequency components in an optimum high frequency band of the video signal, a differentiator, a detector, and a lowpass filter for generating a dc signal whose magnitude represents the degree of focus of the corresponding camera. The low pass filters of the two circuits are connected to a difference amplifier which generates a signal that drives a servo that moves the objective lens towards and away from the object.

N74-20008× National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.
FORMATION OF STAR TRACKING RETICLES Patent
14 INSTRUMENTATION AND PHOTOGRAPHY

(NASA-Case-GSC-11188-3; US-Patent-3,799,793;

The present application is directed towards a process for producing high resolution, substantially non-reflective reticles or choppers suitable for use for transmitting in both the visible and near ultra-violet regions, able to withstand reasonable handling and extreme environmental conditions, and capable of operating at speeds of from 2800 to about 9000 revolutions per minute without distortion. In particular, the present invention is directed towards the production of reticles having a quartz base vacuum coated with chromium, chromium-silver alloy, and silver with electrodeposited copper and black chromium thereon, respectively, in the form of a reticle pattern. The quartz permits the transmission of light while the pattern is opaque to light. The reticles of the present invention are intended for use in optical trackers, such as star trackers used in outer space.

Official Gazette of the U.S. Patent Office

N74-20019# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MULTICHANNEL LOGARITHMIC RF LEVEL DETECTOR Patent Application
Chase P. Hearn and Curtis L. Shriver, inventors (to NASA) Filed 21 Mar. 1974 11 p

A logarithmic radio frequency level detector which can be used to derive gain-weighting signals in an n-channel angle modulation diversity receiving system is discussed. The intermediate frequency signals in the n-channel receiving system are sequentially gated into a single logarithmic intermediate frequency amplifier which compresses the input signal dynamic range by a factor on the order of one hundred to one. The invention is applicable to any situation in which it is desired to measure the amplitudes of a number of radio frequency signals with low differential error.

Official Gazette of the U.S. Patent Office

N74-20020# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
RECORDING APPARATUS Patent Application

An apparatus for obtaining data to be used in evaluating the passenger comfort or ride quality of a surface vehicle is described. Both the random vibration produced by the vehicle and the spontaneous subjective responses of several passengers to the vibration are simultaneously measured and recorded. Adjacent channels of a tape recorder are used to record the data received from accelerometers mounted on the vehicle.

NASA
GAS CHROMATOGRAPH INJECTION SYSTEM Patent Application
(NASA-Case-ARC-10344-2; US-Patent-Appl-SN-446564) Avail:
NTIS HC $4.50 CSCL 14B

An injection system is provided for a gas chromatograph. The crux of the invention is the employment of a chamber which is cool and not under pressure. The sample is placed in the chamber and the solvent is removed by evaporation. The chamber is closed, then, by changing the position of the carrier gas control valve and heating the chamber, the sample is volatilized and swept by a carrier gas into the analysis apparatus.

A superconductive tunneling device with a modified tunnel barrier capable of supporting Josephson tunneling current is described. The device provides a particularly sensitive infrared detector of the Josephson junction type. The primary advantages of the invention are: (1) increased coupling of radiation to junctions, (2) making junctions more selective in their response to radiation, and (3) extending the response of the junctions to radiation of shorter wavelengths than can be found in a modified transfer Hamiltonian model.

A system for providing an auditory display of two-dimensional patterns as an aid to the blind is described. It includes a scanning device for producing first and second voltages respectively indicative of the vertical and horizontal positions of the scan and a further voltage indicative of the intensity at each point of the scan and hence of the presence or absence of the pattern at that point. The voltage related to scan intensity controls transmission of the sounds to the subject so that the subject knows that a portion of the pattern is being encountered by the scan when a tone is heard, the subject determining the position of this portion of the pattern in space by the frequency and interaural difference information contained in the tone.

Official Gazette of the U.S. Patent Office
N74-21015* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

ORBITAL AND ENTRY TRACKING ACCESSORY FOR GLOBES Patent

An orbital and entry tracking accessory or attachment is described which can be mounted on a globe to provide a rapid means of determining range requirements for entry vehicles returning from any orbit to any desired landing site with reasonable accuracy. The device is constructed of clear plastic strip material, and comprises a support ring, a calibrated orbital track member rigidly carried by the support ring, and a calibrated lateral range member pivotally coupled to the support ring at points such that the lateral range member is always oriented normally to the orbital track member. The assembly is mountable on the globe relatively snugly, but freely movable. At least one of the members has a detachable coupling which permits placement of the device on the globe.

Official Gazette of the U.S. Patent Office

N74-21018* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ELECTROMAGNETIC FLOW RATE METER Patent

A liquid metal, whose flow rate is to be determined, is directed through a chamber made of electrically-insulating material on which there is impressed a magnetic field perpendicular to the direction of flow of the liquid metal. The magnetic field is made to increase in strength in a downstream direction of the flow of liquid metal. At least a pair of electrodes are disposed in the chamber traversely and perpendicular to the direction of flow and an ammeter is connected between the electrodes. Electrodes may be disposed in the top or the bottom of the chamber and each may be segmented. Oppositely disposed electrodes may be used with at least one dividing wall extending from each electrode to cause reversal of the direction of flow of the liquid metal. The magnetic field may be provided by electromagnets or permanent magnets such as shaded pole permanent magnets. Official Gazette of the U.S. Patent Office


AUTOMATIC QUADRATURE CONTROL AND MEASURING SYSTEM Patent

A quadrature component cancellation and measuring system comprising a detection system for detecting the quadrature component from a primary signal, including reference circuitry to define the phase of the quadrature component for detection is described. A Raysistor optical coupling control device connects an output from the detection system to a circuit driven by a signal based upon the primary signal. Combining circuitry connects the primary signal and the circuit controlled by the Raysistor device to subtract quadrature components. A known current through the optically sensitive element produces a signal defining the magnitude of the quadrature component.

Official Gazette of the U.S. Patent Office

N74-21019* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

METHOD AND APPARATUS FOR CHECKING FIRE DETECTORS Patent

A fire detector checking method and device are disclosed for nondestructively verifying the operation of installed fire detectors of the type which operate on the principle of detecting
the rate of temperature rise of the ambient air to sound an alarm and/or which sound an alarm when the temperature of the ambient air reaches a preset level. The fire alarm checker uses the principle of effecting a controlled simulated alarm condition to ascertain whether or not the detector will respond. The checker comprises a hand-held instrument employing a controlled heat source, e.g., an electric lamp having a variable input, for heating at a controlled rate an enclosed mass of air in a first compartment, which air mass is then disposed about the fire detector to be checked. A second compartment of the device houses an electronic circuit to sense and adjust the temperature level and heating rate of the heat source.

Official Gazette of the U.S. Patent Office
15 MACHINE ELEMENTS AND PROCESSES

Includes bearings, seals, pumps, and other mechanical equipment; lubrication, friction, and wear; manufacturing processes and quality control, and reliability; drafting; and materials fabrication, handling, and inspection.

N74-10474* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPIRAL GROOVE SEAL Patent
Mating flat surfaces inhibit leakage of a fluid around a stationary shaft. A spiral groove pattern produces a pumping action toward the fluid when the shaft rotates which prevents leakage while a generated hydraulic lifting force separates the mating surfaces to minimize wear.

Official Gazette of the U.S. Patent Office

N74-10476* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
JOURNAL BEARINGS Patent Application
The instability of zero or lightly loaded shafts when they rotate at high speeds in bearings in low viscosity lubricants is considered. This instability refers to a self-excited fractional frequency whirl or tendency of the shaft center to orbit the bearing center at an angular velocity about half that of the shaft around its own center. These problems have been overcome by utilizing bearings of fixed geometry that use a plurality of sectors to provide lobed areas which function as a pump when the rotor turns. The resulting pressure distribution is similar to that obtained in a hydrostatic gas bearing.

N74-10476* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPARATUS FOR PRODUCING HIGH PURITY I-123 Patent Application
James W. Blue, inventor (to NASA) Filed 4 Sep. 1973 13 p
A method is reported for producing high purity radioiodine for thyroid measurement and for use as a general radionuclide. The method involves the bombardment of tellurium powder in targets with a cyclotron beam to produce Xe-123. Flowing gas streams carry the Xe-123 through one cold trap which removes contaminants to another cold trap which removes Xe-123 that subsequently decays to 1-123. During this bombardment energy is deposited in the target material causing its temperature to rise. Some of the tellurium vaporizes and subsequently condenses on surfaces that are cooler than the vaporization temperature. Provision is made for the repeated bombardment of this condensed tellurium.

N74-11300* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPARATUS FOR WELDING BLADES TO ROTORS Patent
Using magnetic force upset welding to form T-joints between dissimilar thickness parts. This type of resistance welding is used to join compressor and turbine parts thereby reducing the weight and cost of a jet engine.

A procedure for forming a pressure tight seal along two edges of super alloy sheets is presented. The procedure consists of flame spraying a powdered aluminum-nickel composition on the joint. The use of frozen carbon dioxide and carbon dioxide gas to maintain a low temperature environment during the flame spraying is described.

A lyophilized spore dispenser is provided which produces a finely divided, monoparticulate cloud of bacterial spores. The spores are contained within a tightly sealed chamber, and a turbulator orifice connected to an air supply source provides a jet of air which stirs up the spores and causes the spores to be suspended in eddy currents within the chamber. This air jet also produces a positive pressure within the chamber which forces the spores out of an injection orifice.

A highly alloyed superalloy material is obtained using prealloyed powders. The material is easily shaped at high temperatures when it becomes superplastic because of its particular microstructure.
To capture fine particulate matter in a gas such as air, a dielectric fluid is directed to the center of whichever face of a rotating disc is exposed to the air flow. The disc is comprised of two or more segments which bear opposite electrostatic potentials. As the dielectric fluid is centrifuged towards the periphery of the rotating disc, the fluid becomes charged to the same potential as the segment over which it is passing. Particulate matter is attracted to the charged segment and is captured by the fluid. The fluid then carries the captured particulate matter to a collection device such as a toroidal container disposed around the periphery of the disc. A grounded electrically-conductive ring may be disposed at the outer periphery of the disc to neutralize the captured particles and the fluid before they enter the container.

A process for molding long, thin-wall tubular bodies from thermosetting plastic molding compounds is described. The tubular bodies produced may have body lengths several times the diameters. The application of the process for manufacturing rocket engine cases and nozzles is discussed. The advantages of the system over other methods of circular tube manufacture are analyzed.
15 MACHINE ELEMENTS AND PROCESSES

**N74-15125**
National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

**SPIRAL GROOVE SEAL**
Lawrence P. Ludwig and Thomas N. Strom, Inventors (to NASA)

N74-Case-XLE-10326-4: US-Patent-3,782,737;

Mating flat surfaces inhibit leakage of a fluid around a stationary shaft. A spiral groove produces a pumping action toward the fluid when the shaft rotates. This prevents leakage while a generated hydraulic lifting force separates the mating surfaces to minimize wear. Provision is made for placing these spiral grooves in communication with the fluid to accelerate the generation of the hydraulic lifting force.

Official Gazette of the U.S. Patent Office

**N74-15128**
National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.

**BIMETALLIC FLUID DISPLACEMENT APPARATUS**


Stirring and heating stored gases and liquids is accomplished by using the deformation of a bimetallic structure which deforms significantly when heated. The deformation is used to effect gradual or impulsive motion of a piston, vane, wire, or diaphragm for displacement of the fluid. The heated bimetallic is also employed for heating the stored fluid.

Official Gazette of the U.S. Patent Office

**N74-15127**
National Aeronautics and Space Administration.
Pasadena Office, Calif.

**COMPACT HYDROGENATOR**

N74-Case-NPO-11682-1: US-Patent-3,782,904;

The development and characteristics of a hydrogenating apparatus are described. The device consists of a reaction chamber which is selectively permeable to atomic hydrogen and catalytically active to a hydrogenating reaction. In one device, hydrogen is pumped out of the reaction chamber while the reactant remains inside to remove molecular hydrogen so that more atomic hydrogen can pass through the walls. In another device, the reactant is pumped through the reaction chamber, and the hydrogen is removed from the material leaving the chamber. The reactant is then cycled through the chamber.

Official Gazette of the U.S. Patent Office

**N74-15128**
National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

**METHOD OF MAKING ROLLING ELEMENT BEARINGS**


A method is described of making rolling elements by forming low mass cores having either hollow centers or being of a low mass material. The low mass cores are plated and heat treated to provide hard surfaces on the rolling elements. After grinding to the proper diameter the rolling elements are assembled between races to form a bearing.

Official Gazette of the U.S. Patent Office
ULTRASONIC SCANNING SYSTEM FOR IN-PLACE INSPECTION OF BRAZED TUBE JOINTS Patent
An ultrasonic scanning system for in-place, non-destructive inspection of brazed tube joints is described. The system is capable of scanning brazed tube joints with limited clearance access, in 1/4 through 5/8 inch union, tee, elbow and cross configurations. The system has the capability to detect defective conditions now associated with material density changes in addition to those which are dependent upon density variations. The system includes a miniature scanning head assembly that fits around a tube joint and rotates the transducer around and down the joint in a continuous spiral motion. The C-scan recorder is similar in principle to conventional models except that it was specially designed to track the continuous spiral scan of the tube joint. The scanner and recorder can be operated with most commercially available ultrasonic flaw detectors.

ANTHROPOMORPHIC MASTER/SLAVE MANIPULATOR SYSTEM Patent Application
An anthropomorphic master/slave manipulator system is described. The master arm apparatus includes: master tubular articulated portions which are coaxially adjacent to one another and relatively rotate, and master transducing apparatus responsive to the relative rotation of the adjacent tubular portions and operative to provide a driving signal. A slave arm apparatus is provided with slave tubular portions corresponding to those portions of the master arm apparatus.

EJECTABLE UNDERWATER SOUND SOURCE RECOVERY ASSEMBLY Patent
An underwater sound source is described that may be ejectably mounted on any mobile device that travels over water, to facilitate in the location and recovery of the device when submerged. A length of flexible line maintains a connection between the mobile device and the sound source. During recovery, the sound source is located by the use of the recovery apparatus attached to the mobile device. An advantage of the invention is that a closed housing is provided with first and second containers and first and second reservoirs for holding materials to be mixed. The materials are transferable from the reservoirs to the first container where they are mixed. The mixed materials are then conveyed from the first container to the second container preferably by dumping the mixed materials into a funnel positioned over the second container. A closed housing is provided with first and second containers and first and second reservoirs for holding materials to be mixed. The materials are transferable from the reservoirs to the first container where they are mixed. The mixed materials are then conveyed from the first container to the second container preferably by dumping the mixed materials into a funnel positioned over the second container. The second container is then moved to a second position for analysis of the mixed materials. For example, the materials may be ignited and the flame analyzed. Access, such as a sight port, is provided in the housing at the analysis position. The device provides a simple and inexpensive apparatus for safely mixing a pyrophoric material and an oxidizer which together form a thermite type mixture that burns to produce a large quantity of heat and light.

APPARATUS FOR REMOTE HANDLING OF MATERIALS Patent
Apparatus for remote handling of materials are described. A closed housing is provided with first and second containers and first and second reservoirs for holding materials to be mixed. The materials are transferable from the reservoirs to the first container where they are mixed. The mixed materials are then conveyed from the first container to the second container preferably by dumping the mixed materials into a funnel positioned over the second container. The second container is then moved to a second position for analysis of the mixed materials. For example, the materials may be ignited and the flame analyzed. Access, such as a sight port, is provided in the housing at the analysis position. The device provides a simple and inexpensive apparatus for safely mixing a pyrophoric material and an oxidizer which together form a thermite type mixture that burns to produce a large quantity of heat and light.

Official Gazette of the U.S. Patent Office
15 MACHINE ELEMENTS AND PROCESSES

METHOD FOR COMPRESSION MOLDING OF THERMOSETTING PLASTICS UTILIZING A TEMPERATURE GRADIENT ACROSS THE PLASTIC TO CURE THE ARTICLE Patent
A method is described for compression molding of thermosetting plastics composition. Heat is applied to the compressed load in a mold cavity and adjusted to hold molding temperature at the interface of the cavity surface and the compressed compound to produce a thermal front. This thermal front advances into the evacuated compound at right angles to the compression load and toward a thermal fence formed at the opposite surface of the compressed compound.
Official Gazette of the U.S. Patent Office

REINFORCED POLYQUINOXALINE GASKET AND METHOD OF PREPARING THE SAME Patent
A gasket or seal resistant to ionizing radiation and liquid hydrogen temperatures is made up of a laminated polyquinoxaline resin-fiberglass cloth body portion and a molded polyquinoxaline encapsulating film. The laminated body is prepared by stacking thin sheets of the resin alternately with fiberglass cloth and heating the assembly under pressure with the temperature, pressure and resin film thickness being controlled so that only partial impregnation of the fiberglass cloth is produced. The encapsulating resin film is preheated at about 300 F and applied to the laminate body by molding at a temperature of about 625 F. The molded gasket is then deflashed and post-cured by heating at 675 to 700 F.
Official Gazette of the U.S. Patent Office
N74-18127* National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

MANUAL ACTUATOR Patent

A method for producing an apertured casting is described. The casting is produced by forming a duplicate in the shape of the finished casting, positioning refractory metal wires to form apertures, and firing the ceramic duplicate in a furnace. The heat of the furnace removes the wires by sublimation and leaves the desired apertures in the casting.

Official Gazette of the U.S. Patent Office
To overcome the problems of bearing friction in relatively large spinning structures, a pair of magnetic bearings were used to suspend or levitate the ends of the axis of a spinning rotor relative to a stator by magnetic forces or flux concentrated in relatively narrow air or vacuum gaps between the bearing rotor and stator. Permanent magnets carried by the rotor generate constant axial bias fluxes in each of the air gaps. A pair of coils, disposed to axially excite the air gaps with variable flux, are driven in a manner so that the sum of the total fluxes in each of the air gaps is varied to change the radial stiffness between the bearing rotor and stator. Axial force between the rotor and stator is produced by exciting the two coils to vary the difference of the total air gap fluxes. The pair of coils are driven in a bridge circuit by pulse width modulated signals.

A mechanical device for receiving a cable and controlling the motion of the cable is described. The cable moves freely in one direction and movement is resisted in the opposite direction until the forces exerted on the cable exceed a predetermined amount. Exceeding the minimum amount of force permits the cable to move in the opposite direction. Diagrams of the device are included.
METHOD OF FLUXLESS BRANDING AND DIFFUSION BONDING OF ALUMINUM CONTAINING COMPONENTS

A method of diffusion bonding and fluxless brazing of aluminum alloys is described. An aluminum containing surface to the oxide-free surfaces. The polymeric substance is vaporized during the bonding process, leaving a clean surface for fluxless brazing. NASA

FIBER SEPARATING AND CLEANING METHOD AND APPARATUS Patent Application

A simple and inexpensive method and apparatus for separating, dispensing, and cleaning particulate material from individual fibers in fiber bundles is introduced. The apparatus, a perforated tube, is housed in a chamber in which a vacuum is drawn. An air jet is directed into one end of the tube and fiber bundles are fed into the jet which separates and pulls fibers into the tube. The tube retains the fibers while fiber fragments, undesirably short fibers, and particulate matter are drawn by the vacuum and resultant air flow out of the tube through its perforations to a suitable discharge. NASA

ULTRASONICALLY BONDED VALVE ASSEMBLY Patent Application

A valve apparatus which is bonded or welded to the seat and then released by the application of the same energy to the bond joint is described. The valve is capable of maintaining a fluid tight seal over a long period of time. The choice of materials for the valve member and the valve seat provides an adequate sealing bond with little adhesion of material when the bond joint is broken for opening the valve. The configuration of the valve and the materials used in the development are described. NASA

DIGITAL CONTROLLER FOR A BAUM FOLDING MACHINE Patent

A digital controller for controlling the operation of a folding machine enables automatic folding of a desired number of sheets responsive to entry of that number into a selector. The controller includes three decade counter stages for corresponding rows of units, tens and hundreds push buttons. Each stage including a decimal-to-BCD encoder, a buffer register, and a digital or binary counter. The BCD representation of the selected count for each decimal is loaded into the respective decade down counters. Pulses generated by a sensor and associated circuitry are used to decrease the count in the decade counters. When the content of the decade counter reaches either 0 or 1, a solenoid control valve is actuated which interrupts operation of the machine. A repeat switch, when actuated, prevents clearing of the buffer registers so that multiple groups of the same number of sheets can be folded without reentering the number into the selector. Official Gazette of the U.S. Patent Office

15 MACHINE ELEMENTS AND PROCESSES
substances have low pour points and a high degree of radiation resistance. Substitution of sulfur for the phenoxy group oxygen of either siloxane compounds has been found to result in a marked improvement in lubricity. The chemical formulas of the organic compounds are presented.

Official Gazette of the U.S. Patent Office

N74-21057* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va. TOTALLY CONFINED EXPLOSIVE WELDING Patent


A method and associated apparatus for confining the undesirable by-products and limiting noise of explosive welding are discussed. The apparatus consists of a simple enclosure into which the explosive is placed and within which the explosion occurs. The shape of the enclosure, the placement of the explosive, and the manner in which the enclosure is placed upon the material to be welded determine the force of the explosion transmitted to the proposed bond area. The explosion is totally confined within the enclosure thus reducing the noise level and preventing debris from being strewn about to contaminate the weld area or create personnel hazards.

Official Gazette of the U.S. Patent Office

N74-21059* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va. METHOD OF FABRICATING AN OBJECT WITH A THIN WALL HAVING A PRECISELY SHAPED SLIT Patent


A method is described for making a structure with a cavity and a thin wall with a precisely shaped slit. An object with a cavity having two openings, one of which is to be closed by a thin wall with a slit, is placed on the surface of a fixture. The fixture surface has a slot conforming to the size and shape of the slit to be formed in the thin wall.

Official Gazette of the U.S. Patent Office

N74-21060* National Aeronautics and Space Administration, Pasadena Office, Calif. OPTICALLY ACTUATED TWO POSITION MECHANICAL MOVER Patent

The characteristics of organosilicon compounds for lubrication under extreme conditions are discussed. The substances considered are thiophenyl ether disiloxanes and trisiloxanes. These
An optically actuated mechanical mover adapted to be moved from an ambient position to an active position, is disclosed. The mechanical mover essentially comprises a piston/cylinder arrangement including a piston that is contained within an internal cylindrical chamber of a housing. The cylindrical chamber is configured to permit the piston to be moved for the length of the chamber as a work stroke. A lock pin extending through the piston, and diametrically opposed walls of the chamber housing, retain the piston in the ambient position at one end of the chamber. An actuator for producing a pressure or shock wave that drives the piston is positioned at the end of the chamber corresponding to the piston ambient position.

Official Gazette of the U.S. Patent Office

A plurality of bearing sectors are mounted in a housing. Each sector functions as a lobed area in the bearing to obtain the required lubricant film geometry.

Official Gazette of the U.S. Patent Office

A glass suitable for glass-to-metal seals that has a resistance to attack by moisture and a high coefficient of linear thermal expansion is introduced. Linear expansion covers the range from 12 to 14 x 10^-6 C between room temperature and 500 C. The glass is essentially composed of, by molar percent, about 9% of K2O, about 10% of Na2O, about 70% of SiO2, about 6% Al2O3, and about 5% of MgO.

Official Gazette of the U.S. Patent Office

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Official Gazette of the U.S. Patent Office

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Official Gazette of the U.S. Patent Office
A low mass rolling element with a lightweight core and hollow center was developed for use in bearings. The core is plated so as to provide a hard surface and increase the life and reliability of the high speed ball bearings.

Official Gazette of the U.S. Patent Office

A flow control valve for high temperature fluids is disclosed. The valve is characterized by an all-metal flow control unit including a tubular conduit, terminating in a valve seat, a throttling cone having an internal, truncated conical surface coaxially related to the valve seat and supported for axial motion relative to the seat, and an axially reciprocable, flow-control plug supported in coaxial relation with the cone. The plug is provided with a truncated conical surface configured to be mated with the surface of the throttling cone for regulating a flow of fluid established through the unit and a curved shut-off surface.

Official Gazette of the U.S. Patent Office
16 MASERS

Includes applications of masers and lasers. For basic research see: 26 Physics, Solid State.


TUNABLE CAVITY RESONATOR WITH RAMP SHAPED SUPPORTS Patent

A cavity for a hydrogen maser is described consisting of three parts which provide highly stable mechanical and thermal expansion characteristics for the cavity and ease of tuning. The three parts which are made of a glass ceramic material having a very small thermal expansion coefficient (1) a top plate, (2) a cylinder with three interrupted helical ramps at its bottom, and (3) a base which includes a bottom plate and three ramp lugs on which the helical ramps of the cylinder rest when the cylinder is placed on the base with the bottom plate in the cylinder. Cavity tuning is achieved by rotating the cylinder and thereby raising or lowering it on the base, which results in changing the cylinder volume by changing the distance between the bottom and top plates.

N74-15145* National Aeronautics and Space Administration, Pasadena Office, Calif.

SHORT RANGE LASER OBSTACLE DETECTOR Patent

A short range obstacle detector for surface vehicles is described which utilizes an array of laser diodes. The diodes operate one at a time, with one diode for each adjacent azimuth sector. A vibrating mirror a short distance above the surface provides continuous scanning in elevation for all azimuth sectors. A diode laser is synchronized with the vibrating mirror to enable one diode laser to be fired, by pulses from a clock pulse source, a number of times during each elevation scan cycle. The time for a given pulse of light to be reflected from an obstacle and received is detected as a measure of range to the obstacle.


THERMOMAGNETIC RECORDING AND MAGNETO-OPTIC PLAYBACK SYSTEM HAVING CONSTANT INTENSITY LASER BEAM CONTROL Patent

A system is developed for maintaining the intensity of a laser beam at a constant level in a thermomagnetic recording and magneto-optic playback system in which an isotropic film is scanned along a continuous path by the laser beam for recording. As each successive area of the path is heated locally to the vicinity of its Curie point in the presence of a controlled magnetic field, a magneto-optic density is produced proportional to the amplitude of the controlled magnetic field. To play back the recorded signal, the intensity of the laser beam is reduced and a Faraday or Kerr effect analyzer is used, with a photodetector, as a transducer for producing an output signal.

Official Gazette of the U.S. Patent Office
16 MASERS

METHOD AND APPARATUS FOR CHECKING THE STABILITY OF A SETUP FOR MAKING REFLECTION TYPE HOLOGRAMS Patent

A method and apparatus are described for checking the stability of a setup for recording reflection-type (white light) holograms. Two sets of interference fringes are simultaneously obtained, one giving information about coherence and stability of the setup alone and the other demonstrating coherence of the entire system, including the holographic recording plate. Special emphasis is given to the stability of the plate, due to the fact that any minute vibration might severely degrade or completely destroy the recording.

Official Gazette of the U.S. Patent Office

N74-16187* National Aeronautics and Space Administration. Pasadena Office, Calif.
INERT GAS METALLIC VAPOR LASER Patent Application
Gary R. Russell (JPL), Noble M. Nerheim (JPL), and Thomas J. Pivirotto, inventors (to NASA) Filed 3 Dec. 1973 23 p

A gas laser which uses a mixture of inert gases and metallic vapors as the lasing material was developed. The laser operates in a pulsed mode to provide high average power output. Copper vapor and an inert gas, such as argon or helium, are pulsed by electrodes which receive power from an appropriate pulsed power supply. The laser also includes a pair of mirrors which are spaced apart along an axis defined as the cavity axis about which the electrodes are aligned. The lasing mixture flows in a direction perpendicular to the cavity axis and the current flow direction between the two electrodes.

TESTING DEVICE USING X-RAY LASERS Patent Application
Carroll C. Dailey, inventor (to NASA) Filed 25 Feb. 1974 7 p

In order to test X-ray reflecting and focussing surfaces, an X-ray laser is placed near the surface to be tested to provide a nearly parallel beam of X-rays. The testing device is much smaller and more compact, and much less expensive, than conventional long-path vacuum X-ray generators.

N74-20118* National Aeronautics and Space Administration. Washington, D.C.
LASER SYSTEM WITH AN ANTIRESONANT OPTICAL RING Patent Application
Anthony E. Siegman, inventor (to NASA) (Stanford Univ.) Filed 2 Nov. 1973 22 p
(Grant NGL-05-020-103)

Various applications of an antiresonant ring, consisting of a beam splitter and a number of reflectors are discussed. With the beam splitter having a transmission coefficient equal to a reflection coefficient, an optical beam incident on the beam splitter along a first axis is split into two components which circulate around the ring in opposite directions and are recombined to reflect back the beam along the first axis, with none of the beam power being directed along a second axis. The ring can be used as part of the cavity of two otherwise independent lasers, with two separate laser mediums external to the ring, or with a multi-wavelength laser medium in the ring.

N74-21091* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LONG RANGE LASER TRAVERSING SYSTEM Patent
Louis O. Caudill, inventor (to NASA) Issued 16 Apr. 1974

Official Gazette of the U.S. Patent Office
The relative azimuth bearing between first and second spaced terrestrial points which may be obscured from each other by intervening terrain is measured by placing at one of the points a laser source for projecting a collimated beam upwardly in the vertical plane. The collimated laser beam is detected at the second point by positioning the optical axis of a receiving instrument for the laser beam in such a manner that the beam intercepts the optical axis. In response to the optical axis intercepting the beam, the beam is deflected into two different ray paths by a beam splitter having an apex located on the optical axis. The energy in the ray paths is detected by separate photoresponsive elements that drive logic networks for proving indications of: (1) the optical axis intercepting the beam; (2) the beam being on the left of the optical axis and (3) the beam being on the right side of the optical axis.
METHOD OF HEAT TREATING A FORMED POWDER PRODUCT MATERIAL Patent


Heat treating a product material of prealloyed powders after shaping by superplastic deformation restores the ability of the material to resist deformation at high temperatures. Heat treating is accomplished by heating to a temperature between the solidus and liquidus with the application of isostatic pressure to close any voids. This pressure may be simultaneously applied while the material is at the heat treating temperature. The pressure may also be applied when the material cools to a temperature between that at which it is shaped and the solidus.

Official Gazette of the U.S. Patent Office
18 MATERIALS, NONMETALLIC

Includes corrosion; physical and mechanical properties of materials (e.g., plastics); and elastomers, hydraulic fluids, etc. For basic research see: 06 Chemistry. For related information see also: 17 Materials, Metallic; 27 Propellants; and 32 Structural Mechanics.


An ultraviolet light reflective coating is disclosed which exhibits high reflectance to ultraviolet light having wavelengths down to about 2,000 Angstrom units. The coating composition comprises a dispersion of barium sulphate in an aqueous solution of a water soluble inorganic binder selected from the group consisting of alkali metal sulphates, ammonium sulphate, and mixtures of the two sulphates. The coating is preferably employed in conjunction with an alkaline primer. NASA


A closed cell foam is described for ballistic protection which has superior properties to the flammable foams of combustible and/or noxious gas nature. The foam is based on a polyurethane resin and is filled with fibers, preferably glass fibers. The foam has good fire resistant properties and does not produce noxious fumes when heated. It has good mechanical properties and does not require external support. NASA


An invention is described which deposits metal alloy films on a metal object. A glow discharge is established by applying a high voltage between an anode and a cathode object disposed in an inert gas atmosphere. An alloy of two or more metals is vaporized and the vapor injected into the glow discharge causing the alloy to be plated onto the cathode object. Official Gazette of the U.S. Patent Office


A silica surface insulation material, ordinarily in the form of reusable tiles, is provided which is easy to manufacture and has efficient fire retardant and insulating properties. The method is shown wherein silica fibers are washed, blended with a colloidal silica permanent binder and a temporary binder and are then mixed and molded into a desired shape. The tiles are then dried and fired at an elevated temperature which burns out the temporary binder and leaves only the silica fibers fused to fused silica. Upon cooling, the tiles are machined to a desired size. NASA
An improved technique of attaching rigid thermal insulator tiles to metallic sub-panels or structural members on the exposed surfaces of spacecraft or other frameworks is described. Heretofore this has been done by a flexible bond, but it has been found that at temperatures below the glass transition range such bonds lose their flexibility and transfer more strains to the insulator tiles. The problem is solved by incorporation of a strain arrestor plate adjacent to the insulator tile and secured with an adhesive which may be either a flexible bond or a hard bond. Since most rigid thermal insulators are made of low expansion materials, Invar may be used for the plate, where weight is not a problem, but the preferred material is the lighter weight combination of graphite fibers cast in a thermosetting resin. The preferred material is graphite fibers in an epoxy resin, built up in layers with various fiber orientations to obtain the desired strength, stiffness and thermal properties. NASA


A laminate thermal control coating for spacecraft is described. The coating is comprised of a layer of solar radiation stable film, a layer of particulate-radiation stable film applied to the upper surface of the solar-radiation stable film, and a layer of reflecting material applied to the lower surface of the solar radiation stable film. The coating experiences no increase in solar radiation absorptance upon exposure to particular or solar radiation as the particulate radiation is substantially absorbed in the particulate radiation stable layer and the solar radiation partially absorbed by the particulate radiation stable layer is transmitted by the solar-radiation stable film to the reflecting material which reflects it back through the laminate and into space. NASA


Nonflammable coating compositions are described for use in high-oxygen environments which include an aqueous suspension of synthetic mica, an alkali metal silicate gelant and a waterbase latex resin emulsion. Inorganic white and/or color pigments and additives such as glass microballoons are employed to provide a wide range of colors and optical properties. Official Gazette of the U.S. Patent Office


Coated metallic base systems are described with particular attention to oxidation-resistant alloy overlay coatings and claddings on superalloys and dispersion-strengthened alloys. A ductile, oxidation-resistant metallic alloy layer covers the surface of a superalloy substrate. This layer is achieved by foil cladding, physical vapor deposition, ion plating, sputtering, plasma spraying or slurry sintering. The chemistry of the overlay layer is such that the oxidation resistance of the subsequently aluminized outermost layer is not seriously degraded. The alumoxide inner layer can be developed by pack cementation, metalizing, dipping, spraying, physical vapor deposition, ion plating, sputtering, or electrophorosis. NASA


A process is described for impregnating and polymerizing in situ, on a substrate, equimolar amounts of aromatic or heterocyclic
bis(orthodiamine). The reaction is carried out in situ on the substrate at room temperature or below. Final curing is then obtained by heating the impregnated substrate at temperatures above 300°C to yield a polymer with molecular weights of 5,000 to 1,000,000. The monomer solution is prepared by first mixing solutions of the bis(orthodiamine) and phenylglyoxal and applying the resulting solution to the substrate or by applying the solutions of starting materials, separately to the substrate. In a preferred embodiment, equimolar amounts of solutions of 4,4′-bis(phenylglyoxalyl) diphenyl ether and 3,3′,4,4′-tetrakisaminobenzophenone are mixed and the resulting solution applied to graphite fiber wound on a mandrel, the solvent removed, and final cure carried out at a temperature of 315°C for 1-1/2 hours.

N74-21156* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ULTRAVIOLET AND THERMALLY STABLE POLYMER COMPOSITIONS Patent
A class of polymers is provided, namely, poly(diarylsiloxyl) arylazines. These polymers have a basic chemical composition which has the property of stabilizing the optical and physical properties of the polymer against the degradative effect of ultraviolet light and high temperatures. This stabilization occurs at wavelengths including those shorter than found on the surface of the earth and in the absence or presence of oxygen, making the polymers of the present invention useful for high performance coating applications in extraterrestrial space as well as similar applications in terrestrial service. The invention also provides aromatic azines which are useful in the preparation of polymers such as those of the present invention.

Official Gazette of the U.S. Patent Office
19 MATHEMATICS

Includes calculation methods and theory and numerical analysis. For applications see specific categories. For related information see also 08 Computers.

No abstracts in this subject category.
20 METEOROLOGY

Includes climatology, weather forecasting, and visibility studies. For related information see also: 13 Geophysics, and 30 Space Sciences.

No abstracts in this subject category.
21 NAVIGATION

Includes guidance: autopilots; star and planet tracking; inertial platforms; and air traffic control. For related information see also: 07 Communications.

N74-13420* National Aeronautics and Space Administration.
Flight Research Center, Edwards, Calif.
TERMINAL GUIDANCE SYSTEM Patent
Shu W. Gee, inventor (to NASA) Issued 4 Dec. 1973 15 p
Filed 6 Mar. 1972 Supersedes N72-21632 (10 - 12. p 1638)
(NASA-Case-FRC-10049-1; US-Patent-3776,455;
US-Patent-Class-244-77A; US-Patent-Class-244-77B;

A terminal guidance system is described including a heading command subsystem and a glide-slope command subsystem which develop command signals for use in guiding an aircraft or other vehicle into a preselected heading and/or altitude at a terminal point. The heading command subsystem is responsive to certain input data and continuously develops command signals for use in directing the aircraft from a remote location to a terminal point so that upon arrival it has a preselected terminal heading. The glide-slope command subsystem is responsive to certain other input data and continuously develops command signals for use in controlling the rate of descent of the aircraft so that it will have a preselected altitude and glide-slope upon arrival at the terminal. Official Gazette of the U.S. Patent Office
22 NUCLEAR ENGINEERING

Includes nuclear reactors and nuclear heat sources used for propulsion and auxiliary power. For basic research see: 24 Physics, Atomic, Molecular, and Nuclear. For related information see also: 03 Auxiliary Systems; and 28 Propulsion Systems.

No abstracts in this subject category.
PHYSICS, GENERAL

Includes acoustics, cryogenics, mechanics, and optics. For astrophysics see: 30 Space Sciences. For geophysics and related information see also: 13 Geophysics; 20 Meteorology; and 29 Space Radiation.

N74-13438* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.


A near-Lambertian diffuser is described which transmits and reflects ultraviolet light. An ultraviolet grade fused silica substrate is coated with vaporized fused silica. The coating thickness is controlled, one thickness causing ultraviolet light to diffuse and another thickness causing ultraviolet light to reflect a near Lambertian pattern. Official Gazette of the U.S. Patent Office

ULTRAVIOLET LIGHT SOURCE DIFFUSER LAMBERTIAN PATTERN


High voltage is applied to an arc gap adjacent to a test specimen to develop a succession of high frequency arc discharges. Those high frequency arc discharges generate pulses of ultrasonic energy within the test specimen without requiring the arc discharges to contact that test specimen and without requiring a coupling medium. Those pulses can be used for detection of flaws and measurements of certain properties and stresses within the test specimen. Official Gazette of the U.S. Patent Office

N74-18323* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala.


A cryogenic gyroscope housing having gas spin-up means provided in annular discs inserted between housing shells is described. A circumferential recess in the inner edges of the discs at their juncture serves as the gas spin-up channel, and recesses in the discs at their junctures with the shells form suction channels. The discs also have inlet and outlet ports communicating with the spin-up channel and exhaust slots communicating with the suction channels. Mating surfaces of the discs and housing shells are held in position by optical contact at the equatorial plane of the housing. Suspension electrodes and thin-film readout loops are disposed in shells. A centering band and clamp rings provide for proper alignment and placement of parts in formation of optical contact joints. Official Gazette of the U.S. Patent Office

N74-21300* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.


A shutter element is described which is formed by a loop of an electrically conductive ribbon disposed adjacent to the end of a passageway to be shuttered. The shuttered end of the passageway is cut at an acute angle. The two leg portions of the ribbon loop are closely spaced to each other and disposed in a plane parallel to the axis of the passageway. A pulse of high current is switched through the loop to cause the current flowing in opposite directions through adjacent leg portions of the ribbon. This produces a magnetically induced pressure on one of the legs of the ribbon forcing the leg over the end of the passageway in gas tight sealing engagement, and thereby blocking passageway. Official Gazette of the U.S. Patent Office
METHOD AND APPARATUS FOR OPTICALLY MONITORING THE ANGULAR POSITION OF A ROTATING MIRROR

Patent

An optical system monitors the angular position of a rotating scanning mirror to indicate the effective start and end of each scan. At a certain angular position, a ray of energy transmitted to the mirror is reflected a plurality of times between the reflectors associated with the optical system and the line on the mirror parallel to the axis, and then to a detector to sense that angular position. A single optical system may be arranged to sense a plurality of different angular positions for each revolution of the mirror.

Official Gazette of the U.S. Patent Office
includes atomic, molecular and nuclear physics. For applications see: 22 Nuclear Engineering. For related information see also: 29 Space Radiation.

N74-19310* National Aeronautics and Space Administration, Washington, D.C.
DOPPLER SHIFT SYSTEM Patent
A system is described for measuring velocities of radiating particles based on Doppler shift. Light from the particles is directed through a narrow band optical filter to a Fabry-Perot interferometer initially tuned to a selected center line corresponding to zero particle Doppler shift. The movable mirror of the interferometer is made to sweep about the center line by the output of a modulation oscillator. The fringe pattern output is imaged onto a pinhole through which light is directed to a photomultiplier. The output of the photomultiplier is supplied to a phase sensitive detector with the oscillator output as a reference signal and which operates in the quadrature mode. The detector's output is gain controlled and is combined with the oscillator's output to adjust the interferometer's movable mirror to acquire the line center.

N74-20329* National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
RADIATION HARDENING OF MOS DEVICES BY BORON Patent
A technique is described for radiation hardening of MOS devices and specifically for stabilizing the gate threshold potential at room temperature of a radiation subjected MOS field-effect device with a semiconductor substrate, an insulating layer of oxide on the substrate, and a gate electrode disposed on the insulating layer. The boron is introduced within a layer of the oxide of about 100 A-300 A thickness immediately adjacent the semiconductor-insulator interface. The concentration of boron in the oxide layer is preferably maintained on the order of 10 to the 18th power atoms/cm. The technique serves to reduce and substantially annihilate radiation induced positive gate charge accumulations.
25 PHYSICS, PLASMA

Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

No abstracts in this subject category.
PHYSICS, SOLID-STATE

Includes semiconductor theory, and superconductivity. For applications see: 16 Masers. For related information see also: 10 Electronics.

No abstracts in this subject category.
27 PROPELLANTS

Includes fuels, igniters, and oxidizers. For basic research see: 06 Chemistry; and 33 Thermodynamics and Combustion. For related information see also: 28 Propulsion Systems.

N74-20397# National Aeronautics and Space Administration, Pasadena Office, Calif.

PREVENTION OF HYDROGEN EMBRITTLEMENT OF HIGH STRENGTH STEEL Patent Application

Delayed failure of high strength steel alloys exposed to compositions containing hydrazine is prevented by addition of potassium hydroxide to the composition in an amount at least sufficient to neutralize acidic impurities. The removal of the acidic impurities eliminates evolution of hydrogen and thus avoids hydrogen embrittlement of the high strength steel alloys. NASA
28 PROPULSION SYSTEMS

Includes air breathing, electric, liquid, solid, and magneto-hydrodynamic propulsion. For nuclear propulsion see: 22 Nuclear Engineering. For basic research see: 23 Physics. General; and 33 Thermodynamics and Combustion. For applications see: 31 Space Vehicles. For related information see also: 27 Propellants.

**SUPERSONIC-COMBUSTION ROCKET** Patent


A supersonic combustion rocket is provided in which a small rocket motor is substituted for heavy turbo pumps in a conventional rocket engine. The substitution results in a substantial reduction in rocket engine weight. The flame emanating from the small rocket motor can act to ignite non-hypergolic fuels.

Official Gazette of the U.S. Patent Office

**GAS TURBINE EXHAUST NOZZLE** Patent


An elongated hollow string is disposed in an exhaust nozzle combustion chamber and communicates with an air source through hollow struts at one end. The other end of the string is bell-mouth shaped and extends over the front portion of a nozzle plug. The bell-mouth may be formed by pivotally mounted flaps or leaves which are used to vary the exhaust throat area and the area between the plug and the leaves. Air from the engine inlet flows into the string and also between the combustion chamber and a housing disposed around the chamber. The air cools the plug and serves as a low velocity inner core of secondary gas to provide noise reduction for the primary exhaust gas while the other air, when it exits from the nozzle, forms an outer low velocity layer to further reduce noise. The structure produces increased thrust in a turbojet or turbofan engine.

Official Gazette of the U.S. Patent Office
SPACE RADIATION

Includes cosmic radiation: solar flares, solar radiation, and Van Allen radiation belts. For related information see also: 13 Geophysics; and 24 Physics. Atomic, Molecular, and Nuclear.

N74-14496// National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

SOLAR ENERGY POWER SYSTEM Patent Application
NTIS HC $3.00 CSCL 20M

A solar energy vapor (freon) powered system is described for generating electrical energy in which a portion of the heat absorbed from the sun in daylight is stored for use during darkness by a thermal capacitor. A mass of Pyrone, having a high thermal capacity, liquifies when heat is applied to it and goes through a solidification process to provide a heat output. A highly efficient solar boiler is constructed, utilizing an anodized titanium surface and a particular combination of shaped boiler tubes and complementary reflectors. The overall efficiency of the system is further improved by an arrangement of heat recovery devices.

NASA
30 SPACE SCIENCES

Includes astronomy and astrophysics; cosmology; lunar and planetary flight and exploration; and theoretical analysis of orbit and trajectory. For related information see also: 11 Facilities, Research and Support; and 31 Space Vehicles.

No abstracts in this subject category.
A space vehicle with an improved ascent configuration was designed. The spacecraft consisted of a winged orbiter with an elongated fuselage and rearwardly directed main engines fixed to the fuselage. A tank assembly located on the forward portion of the fuselage and connected with the main engines supplies liquid rocket propellants. A booster stage consisting of a pair of integrated solid rocket boosters is connected with the orbiter immediately below the fuselage and parallel to it. Drawings of the spacecraft configuration are provided. An analysis of the anticipated performance characteristics is developed.
32 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; thermal stress; impact phenomena; vibration; flutter; inflatable structures; and structural tests. For related information see also: 17 Materials, Metallic, and 18 Materials, Nonmetallic.

N74-19529 National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

ANTI-BUCKLING FATIGUE TEST ASSEMBLY Patent
Fred E. Eichenbrenner and Leland A. Imig, inventors (to NASA)

An antibuckling fatigue test assembly is described for holding a metal specimen which is subjected to compression and to rapid cyclical heating and cooling while permitting visual observation. In an illustrative embodiment of this invention, the anti-buckling fatigue test apparatus includes first and second guide members between which the metal specimen is disposed and held, a heating assembly comprising a suitable heating source such as a quartz lamp and a reflecting assembly directing the heat onto the specimen, and a cooling assembly for directing a suitable cooling fluid such as air onto the specimen. The guide members each have a passage to permit the heat to be directed onto the specimen. An opening is provided in the reflecting assembly to permit visual inspection of that region of the specimen adjacent to the opening onto which the heat is directed.

Official Gazette of the U.S. Patent Office
33 THERMODYNAMICS AND COMBUSTION

Includes ablation, cooling, heating, heat transfer, thermal balance, and other thermal effects, and combustion theory. For related information see also: 12 Fluid Mechanics; and 27 Propellants.

N74-18562 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

DUAL MEASUREMENT ABLATION SENSOR Patent

A dual measurement ablation sensor for measuring both char-interface and surface recession at a point in an ablation material is described. The sensor permits measurement of the thickness of the char layer. Char-interface recession is indicated by a drop in the resistance to a current passed through the ablation material. Surface recession is indicated by the closing of an electrical circuit when melting causes the release of a spring switch.

N74-18552 National Aeronautics and Space Administration. Pasadena Office, Calif.

HEAT TRANSFER DEVICE Patent

A heat transfer device is characterized by an hermetically sealed tubular housing including a tubular shell terminating in spaced end plates, and a tubular mesh wick concentrically arranged and operatively supported within said housing. The invention provides an improved wicking restraint formed as an elongated and radially expanded tubular helix concentrically related to the wick and adapted to be axially foreshortened and radially expanded into engagement with the wick in response to an axially applied compressive load. The wick is continuously supported in a contiguous relationship with the internal surfaces of the shell.

METHOD FOR DETERMINING THERMO-PHYSICAL PROPERTIES OF SPECIMENS Patent

The square root of the product of thermophysical properties \( q \cdot c \) and \( k \), where \( p \) is density, \( c \) is specific heat and \( k \) is thermal conductivity, is determined directly on a test specimen such as a wind tunnel model. The test specimen and a reference specimen of known specific heat are positioned at a given distance from a heat source. The specimens are provided with a coating, such as a phase change coating, to visually indicate that a given temperature was reached. A shutter interposed between the heat source and the specimens is opened and a motion picture camera is actuated to provide a time record of the heating step. The temperature of the reference specimen is recorded as a function of time. The heat rate to which both the test and reference specimens were subjected is determined from the temperature time response of the reference specimen by the conventional thin-skin calorimeter equation.

N74-19583 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SELF-REGULATING PROPORTIONALLY CONTROLLED HEATING APPARATUS AND TECHNIQUE Patent Application

A self-regulating, proportionally controlled heating apparatus is described. In the device, a single electrical resistance heating element having a temperature coefficient of resistance serves simultaneously as a heater and a temperature sensor. Block diagrams are provided of the electrical circuits involved. The equipment provides precision control of the temperature of a heater element in a proportional and continuous fashion and eliminates the need for a temperature sensor apart from the heater element itself.
A method for forming a tubular wick for heat pipes is presented. The method consists of steps involving forming the wick blank of a predetermined thickness from multiple layers of stainless steel screen mesh. The process makes it possible to reduce the pore size of the wicks by approximately fifty percent.
34 GENERAL

Includes information of a broad nature related in industrial applications and technology, and to basic research, defense aspects, information retrieval, management, law and related legal matters; and legislative hearings and documents.

No abstracts in this subject category.
This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. This issue of the Abstract Section cites 217 patents and applications for patent introduced into the NASA scientific and technical information system during the period of January 1974 through June 1974. Each entry in the Abstract Section consists of a citation, an abstract, and, in most cases, a key illustration selected from the patent or application for patent. This issue of the Index Section contains entries for 2653 patent and application for patent citations covering the period May 1969 through June 1974. The Index Section contains five indexes -- subject, inventor, source, number and accession number.
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—National Aeronautics and Space Act of 1958

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