Annnotated 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**

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
INDEX SECTION(SECTION 2)

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

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

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

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

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

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

**Accession Number Index:** Lists all inventions in order of ascending NASA Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

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

1. **Using Subject Category:** To identify all NASA inventions in any one of the 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.
PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

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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NASA PATENT LICENSING REGULATIONS

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.
PATENT LICENSING REGULATIONS

Title 14—AERONAUTICS AND SPACE

Chapter V—National Aeronautics and Space Administration

PART 1245—PATENTS

Subpart 2—Patent Licensing Regulations

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

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

Authority: The provisions of this Subpart 2 issued under 42 U.S.C. 2467, 2478(b)(5).

§ 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 subject to short-form licensing procedures. An invention may be designated as a special invention when a determination is made that:

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

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

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

(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 Administrator of NASA within the Administration in accordance with section 305 of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).

§ 1245.202 Basic considerations.

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

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

(c) The Administrator, in determining whether to grant an exclusive license, will evaluate all relevant information submitted by applicants and all other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, their proposed plans to undertake the required investment and development, the impact on competitors, and the benefits of the invention to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States. The territories and possessions of the United States, its territories and possessions by invention may also be given to assisting small businesses and minority business enterprises, as well as economically depressed, low income and labor surplus areas.

(d) All licenses for practical application of inventions shall be by express written instruments. No license shall be granted either expressly or by implication, for a NASA invention except as provided for in § 1245.203 and 245.303 and in any existing or future treaty or agreement between the United States and any foreign government.

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

§ 1245.203 Licenses for practical application of inventions.

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

(b) Nonexclusive licenses. (1) Each invention will be made available to responsible applicants for nonexclusive, revocable licensing in accordance with § 1245.206, and any existing or future treaty or agreement of any existing exclusive license.

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

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

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

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

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

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

(1) The Administrator has determined that: (a) The invention has not been brought to practical application by a nonexclusive licensee in the fields of use or in the geographical locations covered by the application for the exclusive license, or (b) The invention in the United States of America, its territories and possessions by invention may also be given to assisting small businesses and minority business enterprises, as well as economically depressed, low income and labor surplus areas.

(2) Either a notice pursuant to
the exclusive license. (2) The license may be subject to all or less than all fields of use of the invention and shall be related to the invention. (5) The license shall require the licensee of the business in which the invention pertains.

(6) Purpose for which license Is desired; in any one or more of the following categories:

(a) Placement with a small business firm;
(b) Placement with a minority business enterprise;
(c) Location in a surplus labor area; and
(d) Location in an area designated by the Government as economically depressed.

(7) 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 and the number of shares of stock or other consideration, if any, the applicant would be willing to grant or assign to the Government in exchange for the exclusive license.

(8) Any other information submitted with the application that the applicant deems relevant to the Government's decision to grant or not to grant an exclusive license.

§ 1245.207 Application for exclusive license.

(a) Submission of application. An application for exclusive license under § 1245.203(c) for a special invention shall include:

(1) Identification of the applicant, including the name and address of each business or organization applying for the license and the name and address of any representative of the applicant to whom correspondence should be sent.

(b) Contents of an application for exclusive license. In addition to the requirements stated in § 1245.203(c) for an application for a short-form nonexclusive license, an application for an exclusive license shall include:

(1) Applicant's status, if any, in any one or more of the following categories:

(a) Small business firm;
(b) Minority business enterprise;
(c) Location in a surplus labor area; and
(d) Location in an area designated by the Government as economically depressed.

(2) A statement indicating the time, expenditures, and other acts which the applicant considers necessary or proper to a 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 interest of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive license thereunder.

§ 1245.205 Listing the invention as available for licensing has been published in the Federal Register.

(a) License to contractor. There is hereby granted to the contractor reporting an invention made in the performance of work under a contract of the Administrator. A contractor 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. The sublicense may be subject to other reservations as may be in the public interest.

(b) License to successor. In the event of the sale, transfer, merger, or other change of control of the business of a contractor to a successor, the successor as a legal entity is hereby granted the same rights as were granted to the contractor under this section.

(c) License to other companies. The Administrator may grant an exclusive license to a company that is not the contractor for the business; (d) License to the Government. The Administrator may grant an exclusive license to the United States of America for the business; (e) License to government agencies. The Administrator may grant an exclusive license to governmental agencies for the business; (f) License to the United States. The Administrator may grant an exclusive license to the United States of America for the business; (g) License to the Administrator. The Administrator may grant an exclusive license to himself for the business; (h) License to any other party. The Administrator may grant an exclusive license to any other party for the business.
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 shall 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 complying with §§ 1245.206(b) and

1245.207(b) to the NASA Inventions and Contributions Board when the invention is available for consideration of the requested license. Prior to forwarding applications for exclusive licenses to the Inventions and Contributions Board, notice in writing will be given to each nonexclusive licensee of the application for an invention advising of the receipt of the application for the exclusive license and providing each nonexclusive licensee with an opportunity to request a hearing. Receiving neither evidence that practical application of the invention has occurred or is about to occur or, an application for an exclusive license for the invention.

(b) Recommendations of Inventions and Contributions Board. The Inventions and Contributions Board shall, in accordance with the basic considerations set forth in §§ 1245.202 and 1245.203, evaluate all applications for license forwarded by the Assistant General Counsel for Patent Matters. Based upon the facts presented to the Inventions and Contributions Board in the application and any other facts in its possession, the Inventions and Contributions Board shall recommend to the Administrator: (1) Whether a nonexclusive or exclusive license should be granted; (2) the appropriateness 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 nonexclusive licenses—(1) Notice. If the Administrator determines that the best interest of the United States would 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 given by the Patent Counsel. The notice shall announce 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 a written any of the following together with supporting documentation:

(1) 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 shall be made 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 whether to grant the exclusive license as the Board initially recommended or whether a different form of license, if any, should instead be granted. If the Administrator recommends the grant of an exclusive license for the invention.

(3) Grant of exclusive licenses. The Administrator shall review the Board's recommendation and shall determine if the interest of the United States would best be 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. Upon 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 best 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 provided 30 days in which to appeal and request a hearing before the Inventions and Contributions Board without the necessity 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 desiring to file an appeal pursuant to § 1245.204(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 filing an appeal shall be in accordance with § 1245.213. Any matter shall be determined by the Administrator. The Board shall make findings of fact and recommendations with regard to disposition of the appeal. The decision on the appeal shall be made by the Administrator, and such decision shall be final and conclusive, except on questions of law, unless determined by a court of competent jurisdiction to have been fraudulent, or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by substantial evidence.

§ 1245.213 Litigation.

An exclusive licensee shall be granted the right to sue at his own expense any party who infringes the rights set forth in 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 brought without license to the Government and the licensee shall pay costs and any final judgment or decree that may be rendered against the Govern-
ment in such suit. The Government shall also have an absolute right to intervene in any such suit at its own expense. The licensee shall be obligated to promptly furnish to the Government, upon request; copies of all pleadings and other papers filed in any such suit and of evidence adduced in proceedings relating to the licensed patent including, but not limited to, negotiations for settlement and agreements settling claims by a licensee based on the licensed patent, and all other books, documents, papers, and records pertaining to such suit. If, as a result of any such litigation, the patent shall be declared invalid, the licensee shall have the right to surrender his license and be relieved from any further obligation thereunder.

§ 1245.214 Address of communications.
(a) Communications to the Assistant General Counsel for Patent Matters in accordance with §§ 1245.206, 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:

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.

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.

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.

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

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.

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

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.

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

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.

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

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.

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.

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.

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.

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.

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

17 Materials, Metallic
Includes cerments; 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 Abstracts
Includes calculation methods and theory; and numerical analysis. For applications see specific categories. For related information see also: 08 Computers.

20 Meteorology Abstracts
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 Abstracts
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 Abstracts
Includes magnetohydrodynamics. For applications see: 28 Propulsion Systems.

26 Physics, Solid-State Abstracts
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 Abstracts
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 Abstracts
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
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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.

Official Gazette of the U.S. Patent Office

N74-10907* Lockheed-California Co., Burbank.
MULTISTAGE AEROSPACE CRAFT Patent

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.

N74-20646* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRFLOW CONTROL SYSTEM FOR SUPERSONIC INLETS Patent

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 cowling of a supersonic engine inlet. The free piston valves are disposed in dump passageways, each of which begins at a bleed port in the cowling 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 cowling adjacent a free piston valve. Each valve is controlled by reference pressure.

Official Gazette of the U.S. Patent Office
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.

N74-10942* 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

N74-19692* 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...
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.

N74-197000 National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
A PANEL FOR SELECTIVELY ABSORBING SOLAR THER-
MAL ENERGY AND THE METHOD FOR MANUFACTURING
THE PANEL Patent Application
James R. Lowery, inventor (to NASA) Filed 5 Apr. 1974
21 p (NASA-Case-MFS-22562-1; US-Patent-Appl-SN-458484) Avail:
NTIS HC $4.25 CSCL 10A
A panel for selectively absorbing solar thermal energy is

N74-197020 National Aeronautics and Space Administration.
Pasadena Office, Calif.
ELECTRIC POWER GENERATION SYSTEM DIRECTLY
FROM LASER POWER Patent Application
Katsunori Shimada, inventor (to NASA) (JPL) Filed 27 Mar.
1974 17 p (Contract NAS7-100)
(NASA-Case-NPO-13308-1; US-Patent-Appl-SN-455164) Avail:
NTIS HC $4.00 CSCL 10A
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.

N74-13807 Agricultural Research Service, Berkeley, Calif.
Western Regional Research Lab.

ROTARY PLANT GROWTH ACCELERATING APPARATUS
Patent Application
Richard R. Dedolph, inventor (to NASA) Filed 27 Dec. 1973
27 p Sponsored by NASA
(NASA-Case-ARC-10722-1; US-Patent-Appl-SN-428995) Avail:
NTIS HC $3.50 CSCL 06C

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
Henry A. Leun, James P. Connolly, Maurice J. Hitchman, and John E. Humbert, inventors (to NASA) Issued 1 Jan. 1974
8 p Filed 30 Nov. 1971 Supersedes N72-21052 (10 - 12, p. 1559)
(NASA-Case-ARC-10302-1; US-Patent-3,782,334;

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

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
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 of the electrode which may be continuous with an insulating layer over the connecting wire. The invention provides a soft, flexible conductive electrode for biopotential measurements or stimulation which has a low contact potential and which has an electrical cable which will conform to the body contour during body motion.

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 heat 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 expandable 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 dispenser particularly suited for use in dispensing potable water into food and beverage reconstitution bags is described. The dispenser is characterized by an expandable 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; and (4) 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.

NASA

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 air tight 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

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
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.

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 screen which is viewed by a patient through an infinity collimating 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.

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.

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 screen which is viewed by a patient through an infinity collimating 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.
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.

N74-11929 National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.
ULTRAVIOLET AND THERMALLY STABLE POLYMER COMPOSITIONS Patent Application
Ronald F. Reinisch, Hermino R. Gloria, Ronald E. Goldsberry, and Michael J. Adamson, inventors (to NASA) Filed 8 Nov. 1973 19 p
(NASA-Case-ARC-10592-2; US-Patent-Appl-SN-414043) Avail: NTIS HC $3.00 CSCL 07D

Aromatic azines for the preparation of poly(diarylsiloxy) arylamines are reported. These polymers are made by condensing a polyhydroxylated aryl azine monomer with a bisphenol or a diacyl 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.

N74-128124 National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.
POLYMIDE FOAM FOR THE THERMAL INSULATION AND FIRE PROTECTION Patent
Robert W. Rosser, inventor (to NASA) Issued 13 Nov. 1973 4 p Filed 12 Nov. 1971 Supersedes N72-21102 (10 - 12, p 1566)

The preparation of chemically resistant and flame retardant foams from polycarboxylic 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 which reinforcing fibers such as silicon dioxide and carbon fibers may be incorporated were also produced.

Official Gazette of the U.S. Patent Office

N74-128135 National Aeronautics and Space Administration.
General Dynamics/Convair, San Diego, Calif.
CATALYST CARTRIDGE FOR CARBON DIOXIDE REDUCTION PATENT
Sponsored by 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 battiing 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 battiing. The heated reaction mixture passes outwardly through the inner perforated wall and ceramic battiing 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

FLEXIBLE FIRE RETARDANT POLYISOCYANATE MODIFIED NEOPRENE FOAM Patent
John A. Parker and Salvatore A. Ricciuteli, inventors (to NASA) Issued 13 Nov. 1973 3 p Filed 21 Apr. 1971

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

17
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. Goldstein, 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) GRA


LOW LOSS DICHRORIC 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. Official Gazette of the U.S. Patent Office

N74-11006* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

ANTI-MULTIPATH DIGITAL SIGNAL DETECTOR Patent Application

The invention is a detector for radio signals which were transmitted through a multipath medium. The device operates in conjunction with the radio frequency portion of a receiver to detect digital signals which were transmitted in known modulation formats. The transmitted signal is constructed by assigning known and distinct modulation waveforms to a sequence of message symbols, or digits. The basic digital message, which the detector is to reconstruct consists of a sequence of digits, each lasting for a fixed time, say T seconds, and each picked from an alphabet of arbitrary, but fixed, size. For example, in a binary message, the alphabet consists of the digits 0 and 1. In a quartenary message, the alphabet consists of the digits 0, 1, 2, and 3.


LOW LOSS DICHRORIC 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. Official Gazette of the U.S. Patent Office

N74-12843* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

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.

NASA

An automatic frequency control circuit for an FM television transmitter is described. The frequency of the transmitter is sampled during what is termed the back porch portion of the horizontal synchronizing pulse which occurs during the retrace interval, the frequency sample compared with the frequency of a reference oscillator, and a correction applied to the frequency of the transmitter during this portion of the retrace interval.

NASA

A distortionless gated compressor for limiting the amplitude of a signal so as not to produce undesired signal levels responsive thereto is disclosed. The gated compressor includes a distortionless multiplier which multiplies an AC signal from a factor defined by a DC control signal. The compressor includes a plurality of channels each responsive to a signal produced in response to the multiplier's output. When the signal supplied to any channel exceeds a prescribed level, the level of the DC control signal is reduced to reduce the multiplier's output level and thereby prevent the signal applied to any channel from exceeding its prescribed level.

NASA
07 COMMUNICATIONS

N74-20809* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PULSE CODE MODULATED SIGNAL SYNCHRONIZER Patent
Herbert S. Kobayashi, inventor (to NASA) Issued 26 Mar. 1974
(NASA-Case-MSC-12462-1; US-Patent-3,800,227;

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 null 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

N74-20810* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PULSE CODE MODULATED SIGNAL SYNCHRONIZER Patent
Herbert S. Kobayashi, inventor (to NASA) Issued 23 Apr. 1974
11 p. Filed 8 Nov. 1972 Supersedes N73-11142 (11-02, p 0141)

A bit synchronizer for a split phase PCM transmission has first and second loop systems which respectively receive incoming phase coded PCM signals. In the first loop system the incoming bit signals are simultaneously supplied to two channels which alternately receive a generated, phase coded bit signal representative 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

N74-20811* National Aeronautics and Space Administration. Pasadena Office, Calif.
DECISION FEEDBACK LOOP FOR TRACKING A POLYPHASE MODULATED CARRIER Patent
Marvin K. Simon, inventor (to NASA) JPL Issued 23 Apr. 1974

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

ROTATING RASTER GENERATOR Patent
Charles A. Wagner, inventor (to NASA) Issued 9 Apr. 1974
12 p. Filed 17 Nov. 1972 Supersedes N73-14171 (11-05, p 0513)
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.

Official Gazette of the U.S. Patent Office
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

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 SGN = + or - 1 and multiplied by a value delta sub 1 equal to a number of n sub 1 of fractions of a cycle. An error signal is used to advance or retard the counter according to the sign of the sum by an amount equal to the sum.

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

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.

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)

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.

Official Gazette of the U.S. Patent Office
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.

N74-20836* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

A SYNCHRONOUS BINARY ARRAY DIVIDER Patent
Gary Y. Wang, inventor (to NASA) Issued 3 May 1974 8 p
Filed 1 Jul. 1969 Supersedes N70-11132 (08-01, p 0083)
(NASA-Case-ERC-10180-1: US-Patent-3,803,393;
US Patent Office CSCL 098

An asynchronous binary divider formed of an array of identical logic cells is described. Each cell includes a single bit binary subtractor and a selection gate. The array is connected to divisor, dividend, quotient and remainder registers. Divisor and dividend numbers are read into the divisor and dividend registers, respectively. The array of identical logic cells performs the division in parallel asynchronously and places the results of the division in the quotient and remainder registers for subsequent readout.

Official Gazette of the U.S. Patent Office
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.

N74-10194a Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

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 (± or - 100 Hz) an expanded search oscillator output of a frequency range of 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

N74-10200f # Westinghouse Research Labs., Pittsburgh, Pa.

MILLIMETER WAVE PUMPED PARAMETRIC AMPLIFIER Patent Application
Lawrence E. Dickens, inventor (to NASA) Filed 2 Oct. 1973 18 p (Contract NAS5-20149)
(NASA-Case-GSC-11617-1; US-Patent-Appl-SN-402865) Avail: NTIS HC $3.00 CSCL 09A

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 series 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 idle current generated by the diodes.

N74-10195f 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 electron velocities in the beam where the electrons, having a multiplicity of axial velocities, are sorted at high efficiency by collector electrodes. Official Gazette of the U.S. Patent Office

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

LOW SPEED PHASELOCK SPEED CONTROL SYSTEM Patent Application
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.

N74-11060® National Aeronautics and Space Administration.
Langley Research Center, Langley Station, Va.
FLUID PRESSURE AMPLIFIER AND SYSTEM Patent
Howell D. Garner and Richard F. Hallbaum, inventors (to NASA)
A hydraulic beam-deflection amplifier and a method of controlling the same are described. Either a single or a series of cascaded fluid amplifier units are provided and each one of which may include the usual power nozzle, control nozzles, outlet passages and vent passages. All vent passages of each fluid amplifier unit lead to an enclosed vent outlet chamber which is connected to the ambient environment or to a return manifold through a variably restricted passage. To control the fluid amplifier unit, power and control stream pressures are first established, after which the restricted passage is reduced to regulate the input bias, the gain and the input impedance of the fluid amplifier unit.

Official Gazette of the U.S. Patent Office

N74-11069® Duke Univ., Durham, N.C.
REGULATED dc-TO-dc CONVERTER FOR VOLTAGE STEP-UP OR STEP-DOWN WITH INPUT-OUTPUT ISOLATION Patent
Sam Yun-Ming Fang and Thomas G. Wilson, inventors (to NASA)
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

N74-11068® McDonnell-Douglas Corp., St. Louis, Mo.
PHASE-LOCKED SERVO SYSTEM Patent Application
Clifford Burdin, inventor (to NASA) Filed 26 Oct. 1973 19 p
Sponsored by NASA
A phase-locked servo system is described for use in rotating a slip ring assembly at the exact velocity as one axis of a three-axis air bearing table. The system includes two servo loops. The first servo loop includes a rate gyroscope carried on an air bearing table which generates a signal through a summing junction circuit to be compared into an analog error signal coming from a tachometer coupled to slip ring assembly. The corrective signal is applied to a torque motor for rotating the slip ring assembly. The second servo loop includes a pair of photo detector cells which generate pulses responsive to the rotation of the air bearing table and the slip ring assembly. These pulses are fed through a phase detector and a variable gain amplifier to a summing junction circuit for providing a fine adjustment signal to the torque motor for rotating the slip ring assembly.

NASA
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.

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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.

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**INHERENT REDUNDANCY ELECTRIC HEATER**  
Patent  
Bruce H. Kernodle, inventor (to NASA)  
Issued 8 May 1973  
4 p  
Filed 30 Mar. 1972  
Supersedes N72-22221 (10 - 13, p 1719)  
Sponsored by NASA  
(NASA-Case-MFS-21462-1; US-Patent-3,732,397;  
Avail: US Patent Office  
CSCL 09E

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.

Official Gazette of the U.S. Patent Office

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**FULL WAVE MODULATOR-DEMODULATOR AMPLIFIER APPARATUS**  
Patent  
James M. Black, inventor (to NASA)  
Issued 1 Jan. 1974  
4 p  
Filed 13 Jul. 1971  
Supersedes N72-15206 (10 - 06, p 0742)  
(NASA-Case-FRC-10072-1; US-Patent-3,783,389;  
Avail: US Patent Office  
CSCL 09E

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. A circuit is ground  
by a switching circuit responsive to a phase reference signal  
and the operational amplifier is alternately switched between a  
on-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.

Official Gazette of the U.S. Patent Office

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**DIODE-QUAD BRIDGE CIRCUIT MEANS**  
Patent Application  
Dean R. Harrison and John Dimoff, inventors (to NASA)  
Filed 16 Jan. 1974  
20 p

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  
and the direct path signals is determined, and the reflected signals  
are then subtracted from the direct path signals to correct  
for phase delay.

Official Gazette of the U.S. Patent Office

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**POSITION DETERMINATION SYSTEMS**  
Patent Application  
Paul W. Shores, inventor (to NASA)  
Filed 28 Nov. 1973  
17 p  
(NASA-Case-MSC-12593-1; US-Patent-App1-SN-419747)  
Avail: NTIS HC $3.00 CSCL 09A

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.

Official Gazette of the U.S. Patent Office

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**SYSTEM FOR STABILIZING CABLE PHASE DELAY UTILIZING A COAXIAL CABLE UNDER PRESSURE**  
Patent  
Philip A. Clements, inventor (to NASA) (JPL)  
Issued 5 Feb. 1974  
7 p  
Filed 23 Feb. 1973  
Supersedes N73-20238 (11 - 11, p 1262)  
Sponsored by NASA  
(NASA-Case-NPO-13138-1; US-Patent-3,790,906;  
Avail: US Patent Office  
CSCL 09A

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  
and the direct path signals is determined, and the reflected signals  
are then subtracted from the direct path signals to correct  
for phase delay.
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.

Official Gazette of the U.S. Patent Office

N74-17928* National Aeronautics and Space Administration. Pasadena Office, Calif.
BANDED TRANSFORMER CORES Patent
William T. McLyman, inventor (to NASA) Issued 12 Feb. 1974
8 p Filed 28 Aug. 1972 Supersedes N73-22150 (11 - 13, p 1499)

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.

Official Gazette of the U.S. Patent Office

N74-17930* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEMODULATOR FOR CARRIER TRANSDUCERS Patent
5 p Filed 24 Nov. 1972 Supersedes N72-21254 (10 - 12, p 1587) Sponsored by NASA

A carrier type transducer is supplied with a carrier wave via an audio amplifier, a filter, a frequency divider, and an oscillator. The carrier is modulated in accordance with the parameter being measured by the transducer and is fed to the input of a digital data system which may include a voltmeter. The output of the oscillator and the output of each stage of the divider are fed to an AND or a NAND gate and suitable variable and fixed delay circuits to the command input of the digital data system. With this arrangement, the digital data system is commanded to sample at the proper time so that the average voltage of the modulated carrier is measured. It may be utilized with ancillary circuitry for control of the parameter.

Official Gazette of the U.S. Patent Office

N74-18889# National Aeronautics and Space Administration. Pasadena Office, Calif.
SYMMETRICAL ODD-MODULUS FREQUENCY DIVIDER Patent Application
Alexander Engel, inventor (to NASA) (JPL) Filed 12 Mar. 1974
9 p

Official Gazette of the U.S. Patent Office
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 2N counter is then obtained as well as an exclusive OR gate to receive one input signal from the source.

N74-19852® National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PIEZOELECTRIC RELAY Patent Application

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 bimorphs are electrically connected so that the bimorphs of the two pairs are oppositely polarized and deflect in opposite direction relative to the fixed support.

N74-19854® National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
RESONANT WAVEGUIDE STARK CELL Patent Application

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.

N74-20859® National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RAPIDLY PULSED, HIGH INTENSITY, INCOHERENT LIGHT SOURCE Patent

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

09 ELECTRONIC EQUIPMENT


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

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 rotary solenoid shutter drive assembly comprising 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

33
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.
10 ELECTRONICS

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

N74-10223 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
TECHNIQUE FOR EXTENDING THE FREQUENCY RANGE OF DIGITAL DIVIDERS Patent
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.

N74-14956 National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PHASE PROTECTION SYSTEM FOR ac POWER LINES Patent
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.

INTEGRATED CIRCUIT PACKAGE WITH LEAD STRUCTURE AND METHOD OF PREPARING THE SAME Patent
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-
MICROWAVE POWER TRANSMISSION SYSTEM WHEREIN LEVEL OF TRANSMITTED POWER IS CONTROLLED BY REFLECTIONS FROM RECEIVER Patent

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

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36
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

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.


TWO STAGE LIGHT GAS PLASMA PROJECTILE ACCELERATOR Patent Application

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.
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.

N74-13011 National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD FOR OBTAINING OXYGEN FROM LUNAR OR SIMILAR SOIL Patent


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
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.

N74-10415* National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala. 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.

Official Gazette of the U.S. Patent Office

N74-10421# McDonnell-Douglas Astronautics Co., Newport Beach, Calif. 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.

N74-10420# 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 insure 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.

N74-10422# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va. AUTOMATIC MICROBIAL TRANSFER DEVICE Patent Application
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 into 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.

Image Data Rate Converter Having a Drum with a Fixed Head and a Rotatable-Head Patent

Robert T. Menzies, inventor (to NASA) Issued 18 Oct. 1973

Image data converter 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 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.

Ergometer Calibrator Patent Application

Raymond L. Gause, inventor (to NASA) Filed 31 Oct. 1973

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 pedals 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.
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.


ELECTRON MICROSCOPE APERTURE SYSTEM Patent Application
Klaus Heinemann, inventor (to NASA) Filed 28 Jun. 1973
17 p Sponsored by NASA
(NASA-Case-ARC-10448-2; US-Patent-App1-SN-374424) Avail: NTIS HC $3.00 CSCL 2DF

A method of making an electron microscope annular objective lens aperture is described. The method includes: (1) overlaying a specimen aperture base with a first layer of a copper grid and a second layer of a thin collodium film, (2) evaporating a thin conductive metallic layer onto the upper surface of the collodium film, (3) inserting the prepared aperture base into the objective slider of the electron microscope and imaging the condenser aperture onto the image plane and causing a decontamination layer to be deposited on the illuminated area of the metal layer, (4) electrolytically depositing a metal film onto the metallic layer, and (5) removing the contamination layer and underlying layers by ion etching from the side opposite the metallic film.

N74-13120* 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


ELECTRON MICROSCOPE APERTURE SYSTEM Patent Application
Klaus Heinemann, inventor (to NASA) Filed 23 Jul. 1973
17 p Sponsored by NASA
(NASA-Case-ARC-10448-3; US-Patent-App1-SN-381848) Avail: NTIS HC $3.00 CSCL 2DF

An electron microscope is described which includes an electron source, a condenser lens having either a circular aperture for focusing a solid cone of electrons onto a specimen or an annular aperture for focusing a hollow cone of electrons onto the specimen, and an objective lens having an annular objective

N74-13130* TRW, Inc., Redondo Beach, Calif.

METHOD OF AND DEVICE FOR DETERMINING THE CHARACTERISTICS AND FLUX DISTRIBUTION OF MICROMETEORITES Patent
A micrometeorite impact sensing method of 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 stowage container past a photoelectric scanner which produces an output representing the incident light.

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.

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.

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.
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. NASA

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, counter-electrode is vapor deposited on the insulating layer. A bias generator of high impedance is used to set and shift or modulate the spectral response of the device. Official Gazette of the U.S. Patent Office

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. P.N.F.

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. P.N.F.
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
Ronald A. Outlaw, Richard E. Stell, and Ronald F. Hoyt, inventors
Supersedes N72-28460 (10 - 19, p. 2564)
(NASA-Case-LAR-10682-1; US-Patent-3,780,583;

A compact in situ calibration assembly, for ultrahigh vacuum
gages 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.

TEMPERATURE COMPENSATED DIGITAL INERTIAL
SENSOR Patent
1972 Supersedes N73-13436 (11 - 04, p. 0421) Sponsored
by NASA
(NASA-Case-NPO-13044-1; US-Patent-3,782,205;
Patent Office CSCL 14B

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
floation 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

N74-15093 National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.

HEATER-MIXER FOR STORED FLUIDS Patent
Thomas N. Canning, inventor (to NASA) Issued 1 Jan. 1974
p. 2547)
(NASA-Case-ARC-10442-1; US-Patent-3,782,698;
US Patent Office CSCL 14B

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

N74-15096 National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.

OPTICAL INSTRUMENTS Patent
Irving Raymond Abel, inventor (to NASA) (Honeywell, Inc.,
Supersedes N73-22388 (11 - 13, p. 1529) Sponsored by
NASA
(NASA-Case-MSC-14096-1; US-Patent-3,782,835;
Patent Office CSCL 20F

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

Ramesh C. Tyagi (NAS-NRC), James B. Robertson, Karl W. Boer (Univ. of Delaware), and Henry C. Hadley, Jr., inventors (to NASA) (Univ. of Delaware) Issued 5 Feb. 1974 4 p Filed 26 Jul. 1972  
Supersedes N72-28463 (10-19, p 2564)  
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

N74-18089* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.  
METHOD OF FABRICATING AN ARTICLE WITH CAVITIES  
Patent  
Supersedes N72-20396 (10-11, p 1473)  
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

N74-18088* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.  
HIGH FIELD CdS DETECTOR FOR INFRARED RADIATION  
Patent
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.

ELECTROSTATIC ENTRAINED MATERIAL MEASUREMENT SYSTEM Patent Application

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.

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 of the cylinder is illuminated so that the total resistance of the two detectors is 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.

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.

NASA


APPARATUS FOR CALIBRATING AN IMAGE DISSECTOR TUBE Patent Application
Edwin E. Klingman, Ill, inventor (to NASA) Filed 5 Mar. 1974
19 p
(NASA-Case-MFS-22208-1; US-Patent-Appl-SN-448325) Avail: NTIS HC $4.00 CSCL 14B

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.

NASA

N74-18101* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

FLOW MEASURING APPARATUS Patent Application
Paul R. Prokopius, inventor (to NASA) Filed 28 Feb. 1974
19 p
(NASA-Case-LEW-12078-1; US-Patent-Appl-SN-447124) Avail: NTIS HC $4.00 CSCL 14B

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.

NASA
14 INSTRUMENTATION AND PHOTOGRAPHY


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.

THU 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
GAS CHROMATOGRAPH INJECTION SYSTEM Patent Application
(NASA-Case-ARC-10344-2; US-Patent-Appl-SN-448564) Avail: NTIS HC $4.00 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.

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.
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.

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.
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.


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.


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 selfexcited 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.


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 power 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 I-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.

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.

METHOD OF FORMING ARTICLES OF MANUFACTURE FROM SUPERALLOY POWDERS Patent

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.

LYOPHILIZED SPORE DISPENSER Patent

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.

MOLDING PROCESS FOR IMIDAZOPYRROLONE POLYMERS Patent

A process is described for producing shaped articles of imidazopyrrolone polymers comprising molding imidazopyrrolone polymer molding powder under pressure and at a temperature greater than 475°C. Moderate pressures may be employed. Preferably, prior to molding, a preform is prepared by isostatic compression. The preform may be molded at a relatively low initial pressure and temperature; as the temperature is increased to a value greater than 475°C, the pressure is also increased.

METHOD OF MAKING PRESSURE TIGHT SEAL FOR SUPERALLOY Patent

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.

METHOD OF FORMING PRESSURE TIGHT SEAL FOR SUPERALLOY Patent

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.

METHOD OF FORMING ARTICLES OF MANUFACTURE FROM SUPERALLOY POWDERS Patent

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.

FINE PARTICULATE CAPTURE DEVICE Patent Application

N74-11301 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHD OF MAKING PRESSURE TIGHT SEAL FOR SUPERALLOY Patent

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.

N74-13178 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

LYOPHILIZED SPORE DISPENSER Patent

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.

N74-13179 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

METHD OF FORMING ARTICLES OF MANUFACTURE FROM SUPERALLOY POWDERS Patent

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.

N74-13199 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FINE PARTICULATE CAPTURE DEVICE Patent Application

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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.
MACHINE ELEMENTS AND PROCESSES

N74-15125* 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 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

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

COMPACT HYDROGENATOR Patent

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.

BIMETALLIC FLUID DISPLACEMENT APPARATUS Patent

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

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

METHOD OF MAKING ROLLING ELEMENT BEARINGS Patent

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 Johnny L. Haynes, Charles G. Wages, and Hamilton S. Haralson, inventors (to NASA) Issued 11 Dec. 1973 6 p Filed 9 Nov. 1971 Supersedes N72-21482 (10 - 12, p 1618) (NASA-Case-MFS-20767-1: US-Patent-3,777,552; US-Patent-AppI-SN-196898; US-Patent-Class-73-67.85) Avail: US Patent Office CSCL 14D A miniaturized ultrasonic scanning system for nondestructive in-place, non-immersion testing of 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 miniaturized 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 Hubert C. Vykukal, Reginald F. King, and Wilbur C. Vallotton, inventors (to NASA) Filed 24 Jan. 1974 37 p (NASA-Case-ARC-10756-1: US-Patent-Appl-SN-436313) 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 rotating, 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.


APPARATUS FOR REMOTE HANDLING OF MATERIALS Patent Robert B. Kimball (N. Am. Rockwell Corp., Downey, Calif.), David T. Hodder (N. Am. Rockwell Corp., Downey, Calif.), and Walter W. Wrinkle, inventors (to NASA) (N. Am. Rockwell Corp., Downey, Calif.) Issued 5 Feb. 1974 9 p Filed 30 Dec. 1971 Supersedes N72-21476 (10 - 12, p 1617) Sponsored by NASA (NASA-Case-LAR-10634-1: US-Patent-3,790,347; US-Patent-AppI-SN-214084; US-Patent-Class-23-253PC; US-Patent-Class-2359, US-Patent-Class-259-72; US-Patent-Class-312-209; US-Patent-Class-356-85; US-Patent-Class-356-197) 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 studied. 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.
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 mean 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
15 MACHINE ELEMENTS AND PROCESSES

**DIFFUSION WELDING IN AIR Patent**


Solid state welding a butt joint by fusion welding the peripheral surfaces to form a seal is described along with autogenetically cleaning the faying or mating surfaces of the joint by heating the abutting surfaces to 1,200 C and heating to the diffusion welding temperature in air.

**MANUAL ACTUATOR Patent**


An actuator for an exercising machine employable by a crewman aboard a manned spacecraft is presented. The actuator is characterized by a force delivery arm projected from a rotary input shaft of an exercising machine and having a force input handle extended orthogonally from its distal end. The handle includes a hand-grip configured to be received within the palm of the crewman's hand and a grid pivotally supported for angular displacement between a first position, wherein the grid is disposed in an overlying juxtaposition with the hand-grip, and a second position, angularly displaced from the first position, for affording access to the hand-grip, and a latching mechanism fixed to the sole of a shoe worn by the crewman for latching the shoe to the grid when the grid is in the first position.

**METHOD OF MAKING AN APERTURED CASTING 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.

N74-18128* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

N74-18131* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
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 method of diffusion bonding and fluxless brazing of aluminum alloys is described. An aluminum containing surface free surface is then coated with a sealer containing polymeric material. The polymeric material prevents permeation of oxygen to the oxide-free surfaces. The polymeric substance is vaporized during the bonding process, leaving a clean surface for fluxless brazing.

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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.

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.

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OBJECTS OF THE INVENTION

The invention relates to explosive welding in which the undesirable by-products and limiting noise of explosive welding are eliminated. The apparatus consists of a simple enclosure in 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.

METHOD OF FABRICATING AN OBJECT WITH A THIN WALL HAVING A PRECISELY SHAPED SLIT

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.

OPTICALLY ACTUATED TWO POSITION MECHANICAL MOVER

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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

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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

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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 K_{2}O, about 10% of Na_{2}O, about 70% of SiO_{2}, about 6% Al_{2}O_{3}, 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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N74-21064* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HOLLOW ROLLING ELEMENT BEARINGS Patent

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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.

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.
16 MASERS
Includes applications of masers and lasers. For basic re-
search 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.

N74-15146* 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 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 heated 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.

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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


TESTING DEVICE USING X-RAY LASERS Patent Application

Carroll C. Dailey, inventor (to NASA) Filed 25 Feb. 1974 7 p

(NASA-Case-MFS-22409-1; US-Patent-Appl-SN-445398) Avail: NTIS HC $4.00 CSCL 20E

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.

NASA

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 anti-resonant 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.

NASA

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
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.
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 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 with 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 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.

**N74-16246#** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

**PARTICULATE AND SOLAR RADIATION STABLE COATING FOR SPACECRAFT** Patent Application
Wayne S. Slemp, inventor (to NASA) Filed 27 Dec. 1973 10 p
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.

**N74-17283#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**NONFLAMMABLE COATING COMPOSITIONS** Patent
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.

**N74-18197#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**DUPLEX ALUMINIZED COATINGS** Patent Application
Michael A. Gedwill and Salvatore J. Grisaffe, inventors (to NASA) Filed 24 Jan. 1974 9 p
(NASA Case-LEW-11696-2; US-Patent-App-SN-436315) Avail: NTIS HC $4.00 CSCL 11C
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 aluminide outer layer can be developed by pack cementation, metalizing, dipping, spraying, physical vapor deposition, ion plating, sputtering, or electrophoresis.

**N74-20182#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**FABRICATION OF POLYPHENYLQUINOXALINE COMPOSITE ARTICLES BY MEANS OF IN SITU POLYMERIZATION OF MONOMERS** Patent Application
(NASA Case-LEW-11879-1; US-Patent-App-SN-425362) Avail: NTIS HC $4.00 CSCL 11D
A process is described for impregnating and polymerizing in situ, on a substrate, equimolar amounts of aromatic or heterocyclic

76
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' prim, 4,4' prime tetraminobenzophenone 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.


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-3,776,455;
US-Patent-Class-235-150.28; US-Patent-Class-235.150.27;
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.
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.

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

TRANSMITTING AND REFLECTING DIFFUSER Patent

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.

N74-15395* National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

METHOD AND APPARATUS FOR NONDESTRUCTIVE TESTING Patent

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.

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

HIGH SPEED SHUTTER Patent

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.

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

CRYOCGENIC GYROSCOPE HOUSING Patent

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
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
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.

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 pin hole 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.
26 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
(Contract NAS7-811)
(NASA-Case-NPO-12122-1; US-Patent-Appl-SN-401921) Avail:
NTIS HC $4.00 CSCL 211

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

N74-15453* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

N74-13502* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
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
Billy K. Davis, inventor (to NASA). Filed 4 Dec. 1973 18 p
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.
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.

N74-20541# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

A SPACE VEHICLE Patent Application
George L VonPragenau, inventor (to NASA) Filed 21 Mar. 1974 18 p

(NASA-Case-MFS-22734-1; US-Patent-Appl-SN-453232) Avail:
NTIS HC $4.00 CSCL 22B

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.

Official Gazette of the U.S. Patent Office
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.

N74-18552* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

DUAL MEASUREMENT ABLATION SENSOR Patent
Charles A. Guttler, inventor (to NASA) Issued 1 Jan. 1974
5 p Filed 11 Aug. 1971 Supersedes N72-11830 (10-02, p 0262)

A dual measurement ablation sensor for measuring both char-interface and surface recession at a point in an ablating 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. Official Gazette of the U.S. Patent Office

N74-18555* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

METHOD FOR DETERMINING THERMO-PHYSICAL PROPERTIES OF SPECIMENS Patent
Robert A. Jones, inventor (to NASA) Issued 5 Feb. 1974
5 p Filed 18 Aug. 1972 Supersedes N73-11972 (11-02, p 0243)

The square root of the product of thermophysical properties $q$, $c$, 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-skim calorimeter equation. Official Gazette of the U.S. Patent Office

N74-19563* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SELF-REGULATING PROPORTIONALLY CONTROLLED HEATING APPARATUS AND TECHNIQUE Patent Application
Maxwell G. Strange, inventor (to NASA) Filed 27 Feb. 1974
17 p

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. NASA
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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