NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JULY 1979

CASE FILE COPY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
## ACCESSION NUMBER RANGES

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<th>Bibliography Number</th>
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This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.
Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in Scientific and Technical Aerospace Reports (STAR) between January 1979 and June 1979
This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, at price code E04 ($7.50 domestic, $15.00 foreign)
INTRODUCTION

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

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

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

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

The 240 citations published in this issue of the Abstract Section cover the period January 1979 through June 1979. The Index Section contains references to the 3632 citations covering the period May 1969 through June 1979.

ABSTRACT SECTION (SECTION 1)

This PAB issue incorporates the 1975 STAR category revisions which include 10 major subdivisions divided into 74 specific categories and one general category/division (See Table of Contents for the scope note of each category under which are grouped appropriate NASA inventions). This new scheme was devised in lieu of the 34 category divisions which were utilized in PAB supplements (01) through (06) covering STAR abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a STAR citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned in STAR to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

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

- NASA Accession Number
- NASA Case Number
- Inventor's Name
A cylinically shaped enclosure has a source of alpha particles at one end and detectors mounted in tandem at the other end. Two downward-extending baffles and a blocking shield define a forward-scattering angular range in which scattering products from alpha particle/hydrogen and alpha particle/helium collisions can reach the detector's surface. The thickness of the detectors is sized so that alpha particles resulting from alpha particle/helium collisions are absorbed in the first detector and recoil protons resulting from alpha particle/hydrogen collisions pass through the first detector and are absorbed by the second detector. Each scattering product is identified from its ability to penetrate or not penetrate a detection material of predetermined thickness. The output pulses are processed by an electronic processing system. The apparatus could be carried by a planetary probe to one of the outer planets.
INDEX SECTION (SECTION 2)

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

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

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

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

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

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

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

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

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

(1) **Using Subject Category** To identify all NASA inventions in any one of the subject categories in this issue of NASA PAB, select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

(2) **Using Subject Index** To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term (B) Note the indicated Accession Number and the Subject Category Number (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (i) use the Subject Category Number to locate the Subject Category and (ii) use the Accession Number to locate the desired invention within the Subject Category listing.
(3) Using Patent Classification Index. To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated inventions(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

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

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

LICENSES FOR COMMERCIAL USE INQUIRIES AND APPLICATIONS FOR LICENSE

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

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by US patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the Assistant General Counsel for Patent Matters, Code GP-4, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the US Patent Number or the US 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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PART 1245—PATENTS

Title 14—AERONAUTICS AND SPACE

Chapter V—National Aeronautics and Space Administration

Subpart 2—Patent Licensing Regulations

§ 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 of America, its territories and possessions, Puerto Rico, and the District of Columbia, or in any lesser geographic portion thereof.

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.

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.

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

(c) Short-form nonexclusive licenses. A nonexclusive, revocable license, for a special invention, as defined in § 1245.201, shall be granted upon written request, to any applicant by the Patent Counsel of the NASA. The Administrator, in determining whether to grant an exclusive license, will consider all relevant information submitted by applicants and other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, and the benefits of the license to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States, its territories and possessions. Consideration may also be given to assisting small businesses and minority business enterprises, as well as economic development, low income and labor surplus areas.

(d) Exclusive licenses. (1) A limited exclusive license may be granted on an invention available for such licensing that (a) The invention has not been brought to practical application by a nonexclusive licensee; and (b) The public interest would be served by the expedient granting of a nonexclusive license for the practice of the invention by the public.

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

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

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

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

§ 1245.202 Basic considerations.

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

(b) The "Inventions and Contributions Board" will evaluate all relevant information submitted by applicants and other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, and the benefits of the license to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States, its territories and possessions. Consideration may also be given to assisting small businesses and minority business enterprises, as well as economic development, low income and labor surplus areas.

(c) Short-form nonexclusive licenses. A nonexclusive, revocable license, for a special invention, as defined in § 1245.201, shall be granted upon written request, to any applicant by the Patent Counsel of the NASA. The Administrator, in determining whether to grant an exclusive license, will consider all relevant information submitted by applicants and other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, and the benefits of the license to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States, its territories and possessions. Consideration may also be given to assisting small businesses and minority business enterprises, as well as economic development, low income and labor surplus areas.

(d) Exclusive licenses. (1) A limited exclusive license may be granted on an invention available for such licensing that (a) The invention has not been brought to practical application by a nonexclusive licensee; and (b) The public interest would be served by the expedient granting of a nonexclusive license for the practice of the invention by the public.

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

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

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

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

§ 1245.203 Licenses for practical application of inventions.

(a) General. 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 subpart.

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

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

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

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

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

(c) Short-form nonexclusive licenses. A nonexclusive, revocable license, for a special invention, as defined in § 1245.201, shall be granted upon written request, to any applicant by the Patent Counsel of the NASA. The Administrator, in determining whether to grant an exclusive license, will consider all relevant information submitted by applicants and other persons and will consider the necessity for further technical and market development of the invention, the capabilities of prospective licensees, and the benefits of the license to the Government and to the public. Preference for exclusive license shall be given to U.S. citizens or companies who intend to manufacture or use, in the case of a process, the invention in the United States, its territories and possessions. Consideration may also be given to assisting small businesses and minority business enterprises, as well as economic development, low income and labor surplus areas.

(d) Exclusive licenses. (1) A limited exclusive license may be granted on an invention available for such licensing that (a) The invention has not been brought to practical application by a nonexclusive licensee; and (b) The public interest would be served by the expedient granting of a nonexclusive license for the practice of the invention by the public.

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

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

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

(g) The "Inventions and Contributions Board" means the NASA Inventions and Contributions Board established by the Administrator of NASA within the Administration in accordance with section 305 of the National Aeronautics and Space Act of 1958 as amended (42 U.S.C. 2457).
§ 1245.205 Listing the invention as available
The invention has been published in the Federal Register for at least 9
months, or a patent covering the invention has been issued for at least
6 months, or a patent covering the invention has been issued for at least
6 months, or a patent covering the invention has been issued for at least
6 months.

(2) The Administrator shall be notified of a limited exclusive licen-
se or a limited exclusive license may be granted prior to the periods
specified above if the Administrator determines that it is in the public interest.

(3) The exclusive period of the license shall be for the period of the
invention, and throughout the United States of America, its territories and
possessions, Puerto Rico, and the District of Columbia, and, in any lesser geographic
portion thereof.

(4) The license shall require the lic-
see to practice the invention within a
period specified in the license and then
to achieve practical application of the
invention.

(5) The license shall include or require the lic-
see to pay the Government for the exclusive
license and to perform such acts. If the
license is granted,

(a) In consideration of the settlement
of an interference;

(b) In consideration of a release of a
claim of infringement; or

(c) In exchange for or as part of the
consideration for a license under an
domly held patent.

§ 1245.206 Publication of NASA inventions available for license.
(a) A notice will be periodically pub-
lished in the Federal Register listing in-
ventions available for licensing. Abstracts
of the inventions shall be published in the
NASA Scientific and Technical Aerospace Reports (STAR) and other
NASA publications.

(b) Copies of pending patent applica-
tions for inventions abstracted in STAR
may be purchased from the National
Technical Information Service, Spring-
field, Va. 22151.

§ 1245.207 Application for exclusive license.
(a) Submission of application An appli-
cant for exclusive license under § 1245.203(d) may be submitted to NASA
at any time. An application for exclusive license shall be addressed to the NASA
Assistant General Counsel for Patent Matters.

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

(1) Applicant's status, if any, in any
one or more of the following categories.
(1) Small business firm;
(2) Minority business enterprise;
(3) Location in a surplus labor area;
(4) Location in a low-income urban area;
and
(5) Location in an area designated by the Government as economically de-
pressed.

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

(3) A statement whether the appli-
cant 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 posses-
sions, 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; and

(5) Any other facts which the appli-
cant believes to show it to be in the inter-
ests of the United States of America for the Administrator to grant an exclusive license rather than a nonexclusive li-

§ 1245.204 Other licenses.
(a) License to contractor. There is
hereby granted to the contractor report-
able to the Administrator on a regula-
time regular basis, in the perform-
ance of work under a contract of NASA
in the manner prescribed in section 305(a)
(1) or (2) of the National Aeronautics
and Space Act of 1958 as amended (42
U.S.C. 2457(a) (1) or (2)), a revocable,
nonexclusive, royalty-free license for the
practice of such invention, together with
the right to grant sublicenses of the same
scope to the extent the contractor was
legally obligated to do so at the time the
license was awarded. Such license and
right are nontransferable except to the
successor of that part of the contractor's
business to which the invention pertains.

(b) License to contractor. There is
hereby granted to the contractor report-
able to the Administrator on a regula-
time regular basis, in the perform-
ance of work under a contract of NASA
in the manner prescribed in section 305(a)
(1) or (2) of the National Aeronautics
and Space Act of 1958 as amended (42
U.S.C. 2457(a) (1) or (2)), a revocable,
nonexclusive, royalty-free license for the
practice of such invention, together with
the right to grant sublicenses of the same
scope to the extent the contractor was
legally obligated to do so at the time the
license was awarded. Such license and
right are nontransferable except to the
successor of that part of the contractor's
business to which the invention pertains.
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 un-
der §§ 1245.202 and 1245.203 will be re-
viewed by the Assistant General Counsel for Patent Matters, to determine the conformity and appro-
priateness of the application for license and the availability of the specific in-
vention for the license requested. The Assistant General Counsel for Patent Matters will forward all applications for license conforming to §§ 1245.206(b) and 1245.207(b) to the NASA Inventions and Contributions Board when the invention is available for consideration of the re-
quested license. Prior to forwarding ap-
lications for exclusive licenses to the Inventions and Contributions Board, no-
tice in writing will be given to each nonexclusive licensee for the specific in-
vention advising of the receipt of the application for the exclusive license and providing each nonexclusive licensee with a reasonable period for submitting either evidence that practical application of the invention has occurred or is about to occur or, an application for an exclu-
sive license of the invention.

(b) Recommendations of Inventions and Contributions Board. The Inven-
tions and Contributions Board shall, in ac-
cordance with the basic considerations set forth in §§ 1245.202 and 1245.203, evalu-
ate all applications for license for-
warded 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 possession, the In-
ventions and Contributions Board shall re-
commend to the Administrator, (1) Whether a nonexclusive or exclusive license should be granted, (2) the iden-
tity of the licensor, and (3) any special terms or conditions of the license.

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

(d) Determination of Administrator and grant of exclusive licenses—(1) Notice. If the Administrator determines that the best interest of the United States will be served by the granting of an exclu-
sive license in accordance with the basic considerations set forth in §§ 1245.202 and 1245.203, a notice shall be published in the FEDERAL REGISTER
announcing the intent to grant the excl-
sive license, the identification of the intents terms or conditions of the proposed license, and a statement that NASA will grant the exclusive li-
cense unless within 30 days of the publi-
cation date, the Inventions and Contributions Board receives in writing

any of the following together with sup-
porting documentation

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

(ii) An application for a nonexclusive license based on, in accordance with § 1245.206(b), in which applic-
ant states that he has already brought or is likely to bring the invention to prac-
tical 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 submis-
sion of the documents designated above.

(2) Recommendation of Inventions and Contributions Board. Upon the ex-
piration of the period required by sub-
paragraph (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 ini-
tially recommended or whether a dif-
ferent form of license, if any, should instead be granted.

(3) Grant of exclusive licenses The Administrator shall review the Board’s recommendation and shall determine if the best interest of the United States would best be served by the grant of an exclu-
sive license as recommended by the Board. If the Administrator determines to grant the exclusive license, the license shall be granted upon the negotiation of the appropriate terms and conditions of the Office of General Counsel.

§ 1245.209 Royalties and fees.

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

(b) An exclusive license for an invention may require the payment of roy-
alties, fees or other consideration when the licensing circumstances and the basic considerations in § 1245.203, considered together, indicate that it is in the public interest to do so

§ 1245.210 Reports.

A license shall require the licensor to submit periodic reports of his efforts to work the invention. The reports shall contain information within his knowl-
edge, or which he may acquire under normal business practice, pertaining to the commercial use that is being made of the invention and such other infor-
mation which the Administrator may de-
terminate pertinent to the licensing pro-
gram 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 con-
tained, and shall fail to remedy any such default, false report, or breach within 30 days after written notice, or if the patent is deemed unenforceable or invalid by the U.S. court.

(b) Any license granted pursuant to § 1245.204(a) may be revoked, either in part or in its entirety, by the Adminis-
trator if in his opinion such revocation is necessary to achieve the earliest practi-
cal 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 licensor a written notice of intention to revoke the license, which will be allowed 30 days after such notice in which to appeal and request a hearing before the Inventions and Contributions Board in the application.

After a hearing, the Inventions and Con-
tributions Board shall transmit to the Admin-
istrator the record of proceedings, findings of fact and recommenda-
tion whether the license should be re-
voked either in part or in its entirety.

The Administrator shall review the rec-
ommendation of the Board and deter-
mine whether to revoke the license in part or in its entirety. Revocation of a license shall include all sublicences which have been granted.

§ 1245.212 Appeals.

Any person desiring to file an appeal pursuant to § 1245.211(c) shall address the appeal to Chairman, Inventions and Contributions Board. Any person filing an appeal shall be afforded an oppor-
tunity to be heard before the Inventions and Contributions Board, and to present evidence in support of his appeal. The procedures to be followed in any such matter shall be determined by the Ad-

ministrator. The Board shall make find-
ings of fact and recommendations with respect to disposition of the appeal. The decision on the appeal shall be made by the Administrator, and such decision shall be final and conclusive, except on questions of law, unless determined by a court of competent Jurisdiction to have been fraudulent, or capricious, or arbit-
rary, or so grossly erroneous as neces-
sarily to imply bad faith, or not sup-
ported by substantial evidence.

§ 1245.213 Litigation.

An exclusive licensee shall be granted the right to a party who infringes the rights set forth in his license and covered by the licensed patent. The licensee may join the Gov-
ernment, upon consent of the Assistant General, as a party complainant in such suit, but without expense to the Gov-
ernment and the licensee shall pay costs of suit, but without expense to the Govern-

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The Government shall also have an absolute right to intervene in any such suit at its own expense. The licensee shall be obligated to promptly furnish to the Government, upon request, copies of all pleadings and other papers filed in any such suit and of evidence adduced in proceedings relating to the licensed patent including, but not limited to, negotiations for settlement and agreements settling claims by a licensee based on the licensed patent, and all other books, documents, papers, and records pertaining to such suit. If, as a result of any such litigation, the patent shall be declared invalid, the licensee shall have the right to surrender his license and be relieved from any further obligation thereunder.

§ 1245.214 Address of communications.

(a) Communications to the Assistant General Counsel for Patent Matters in accordance with §§ 1245.206 and 1245.207 and requests for information concerning licenses for NASA inventions should be addressed to the Assistant General Counsel for Patent Matters, Code OP, National Aeronautics and Space Administration, Washington, D.C. 20546.

(b) Communications to the Inventions and Contributions Board in accordance with §§ 1245.208, 1245.211, and 1245.212 should be addressed to Chairman, Inventions and Contributions Board, National Aeronautics and Space Administration, Washington, D.C. 20546.

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

JAMES C. FLETCHER,
Administrator.

FOREIGN PATENT LICENSING REGULATIONS

Selected NASA inventions are also available for licensing in countries other than the United States in accordance with the NASA Foreign Patent Licensing Regulation (14 CFR 1245.4), a copy of which is available from any NASA Patent Counsel. For abstracts of NASA-owned inventions available for licensing in countries other than the United States, see NASA SP-7038, "Significant NASA Inventions Available for Licensing in Countries Other Than the United States." A copy of this NASA publication is available from NASA Headquarters, Code GP-4, Washington, D.C. 20546.
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AERONAUTICS
Includes aeronautics (general), aerodynamics, air transportation and safety, aircraft communications and navigation, aircraft design, testing and performance, aircraft instrumentation, aircraft propulsion and power, aircraft stability and control, and research and support facilities (air)
For related information see also Astronautics

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02 AERODYNAMICS 1
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03 AIR TRANSPORTATION AND SAFETY N.A.
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07 AIRCRAFT PROPULSION AND POWER 3
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ASTRONAUTICS
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12 ASTRONAUTICS (GENERAL) N.A.
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15 LAUNCH VEHICLES AND SPACE VEHICLES N.A.
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16 SPACE TRANSPORTATION N.A.
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17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.
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20 SPACECRAFT PROPULSION AND POWER  7
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CHEMISTRY AND MATERIALS
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23 CHEMISTRY AND MATERIALS (GENERAL)  N.A.
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24 COMPOSITE MATERIALS  9
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SPACE SCIENCES
Includes space sciences (general), astronomy, astrophysics, lunar and planetary exploration, solar physics, and space radiation
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89 ASTRONOMY 70
Includes radio and gamma-ray astronomy, celestial mechanics, and astrometry

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Note N.A. means that no abstracts were assigned to this category for this issue

Section 2 • Indexes

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NASA Patent Abstracts Bibliography
A Semiannual Publication of the National Aeronautics and Space Administration

02 AERODYNAMICS
Includes aerodynamics of bodies, combinations wings, rotors, and control surfaces and internal flow in ducts and turbomachinery
For related information see also 34 Fluid Mechanics and Heat Transfer

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

N79-17797*# National Aeronautics and Space Administration Hugh L Dryden Flight Research Center Edwards Calif AN IMPROVED SYSTEM FOR USE IN CONDUCTING WAKE INVESTIGATION FOR A WING IN FLIGHT Patent Application Lawrence C Montoya and Paul F Bikle inventors (to NASA) Filed 28 Feb 1979 19 p (NASA-Case-FRC-11024-1 US-Patent-App1-SN-015983) Avail NTIS HC A02/MF A01 CSCL O1A
A pressure measuring system is described for use in obtaining in-flight wing profile drag measurements for low values of dynamic pressure and Reynolds number. The system is supported by a wing in flight which has a total pressure head arranged in spaced relation with a wake (as the wake is generated by the wing) and a reference static pressure head adapted to be displayed along an accurate path through the wake. A total pressure port and a static pressure port are included. A differential transducer is connected to the heads through a pressure switching device provided to selectively connect the heads to the transducer in opposed relation. Thus a single differential transducer is adapted to be utilized in obtaining differential pressure measurements for the wake.

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

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft air navigation systems (satellite and ground based) and air traffic control. For related information see also 17 Spacecraft Communications, Command, and Tracking and 32 Communications.

N79-10039*# National Aeronautics and Space Administration Pasadena Office Calif
INTERFEROMETRIC LOCATING SYSTEM Patent Application
Peter F MacDoran inventor (to NASA) (JPL) Filed 31 Aug 1978 23 p (Contract NAS7-100)
(NASA-Case-NPO-14173-1 US-Patent-938581) Available NTIS HC A02/MF A01 CSCL17G

An object of the invention is to provide a system for locating aircraft or other targets by a group of land-based radio receivers. One system detects broadband noise emitted from the target to detect even hostile aircraft. Another system utilizes narrow band bursts emitted from low cost transmitters in aircraft to detect a large number of aircraft in an area while requiring a limited frequency band. NASA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

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

N79-12061* National Aeronautics and Space Administration Hugh L Dryden Flight Research Center Edwards Calif
FREE WING ASSEMBLY FOR AN AIRCRAFT Patent
Chester H Wolowicz inventor (to NASA) Issued 7 Nov 1978 9 p Filed 8 Sep 1977 Supersedes N77-31135 (15 - 22 p 2894)

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

N79-17847* National Aeronautics and Space Administration Ames Research Center Moffett Field Calif
CONSTANT LIFE ROTOR FOR A HEAVIER THAN AIR CRAFT Patent

A rotor blade extended radially from a hub characterized by an elongated spar and a plurality of axially aligned shanks pivotally mounted on the spar is presented. Each has an aerodynamic center located in trailing relation with the spar and...
07 AIRCRAFT PROPULSION AND POWER

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

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

N79-10067* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

APPARATUS AND METHOD FOR REDUCING THERMAL STRESS IN A TURBINE ROTOR Patent

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

N79-14095* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

CAM-OPERATED PITCH-CHANGE APPARATUS Patent

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

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

COMPENSATING LINKAGE FOR MAIN ROTOR CONTROL Patent Application

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

**A VELOCITY VECTOR CONTROL SYSTEM AUGMENTED WITH DIRECT LIFT CONTROL**

Patent Application


A pilot controlled stability control system is described that employs direct lift control (spoiler control) with elevator control to control the flight path angle of an aircraft. A computer on the aircraft generates an elevator control signal and a spoiler control signal, using a pilot-controlled pitch control signal and pitch rate, vertical velocity roll angle, groundspeed, engine pressure ratio and vertical acceleration signals which are generated on the aircraft. The direct lift control by the aircraft spoilers improves the response of the aircraft flight path angle and provides short term flight path stabilization against environmental disturbances.

**A PITCH ATTITUDE STABILIZATION SYSTEM UTILIZING ENGINE PRESSURE RATIO FEEDBACK SIGNALS**

Patent Application


The invention relates to a pitch attitude stabilization system in which engine pressure ratio (EPR) signals are used to cancel pitching moments due to changes in thrust. The invention consists essentially of aircraft engine instrumentation that generates an EPR signal. In a first embodiment of the invention, the EPR signal is compared to a reference EPR signal by means of a summing device. The resulting difference signal is multiplied by a constant K sub EPR to form a control signal which cancels pitching moments due to changes in thrust. This control signal is added to the other pitch control signals by a summing device.

**TOW BAR FOR AIRCRAFT**

Patent Application


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

**N79-21083** National Aeronautics and Space Administration
Langley Research Center, Hampton Va
WIND TUNNEL Patent

A supersonic wind tunnel is described for testing several airfoils mounted in a row. A test section of a wind tunnel contains means for mounting air foil sections in a row means for rotating each section about an axis so that the angle of attack of each section changes with the other sections, and means for rotating the row with respect to the air stream so that the row forms an oblique angle with the air stream.

**N79-21084** National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio
HYPERVELOCITY GUN Patent

A velocity amplifier system which uses both electric and chemical energy for projectile propulsion is provided in a compact hypervelocity gun suitable for laboratory use. A relatively heavy layer of a tamping material such as concrete encloses a loop of an electrically conductive material. An explosive charge at least partially surrounding the loop is adapted to collapse the loop upon detonation of the charge. A source of electricity charges the loop through two leads, and an electric switch which is activated by the charge explosive charge, disconnects the leads from the source of electricity and short circuits them. An opening in the tamping material extends to the loop and forms a barrel. The loop, necked down in the opening, forms the sabot on which the projectile is located. When the loop is electrically charged and the explosive detonated the loop is short circuited and collapsed thus building up a magnetic field which acts as a sabot catcher. The sabot is detached from the loop and the sabot and projectile are accelerated to hypervelocity.

**18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE**

Includes spacecraft thermal and environmental control and attitude control. For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design Testing and Performance and 39 Structural Mechanics.

**N79-11108** National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
APPARATUS FOR ASSEMBLING SPACE STRUCTURE Patent
An apparatus for producing a structure in outer space from rolls of prepunched ribbon or sheet material that are transported from the earth to the apparatus located in outer space is described. The apparatus spins the space structure similar to a spider spinning a web utilizing the prepunched ribbon material. The prepunched ribbon material is fed through the apparatus and is shaped into a predetermined channel-shaped configuration. Trusses are punched out of the ribbon and are bent downwardly and attached to a track which normally is a previously laid sheet of material. The size of the overall space structure may be increased by merely attaching an additional roll of sheet material to the apparatus.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g. rocket engines and spacecraft auxiliary power sources.

For related information see also 07 Aircraft Propulsion, 28 Propellants and Fuels, and 44 Energy Production and Conversion.

20 SPACECRAFT PROPULSION AND POWER

LOW THRUST MONOPROPELLANT ENGINE Patent Application
John David Kuenzly, inventor (to NASA) (TRW Redondo Beach, Calif.) 20 Dec 1978 13 p
A low power thermal decomposition type monopropellant thruster is described which may operate in both the pulsing or steady-state modes at duty cycles representative of attitude and velocity control requirements for long-life, earth orbiting satellites. The device includes a conventional body and nozzle configuration with generally opposed injector tubes and a heater-screen pack configuration having a platinum screen and a refractory metal and oxide heater. Carbonaceous low freezing point propellants can be used.

A SYSTEM FOR CONCURRENTLY DELIVERING A STREAM OF POWDERED FUEL AND A STREAM OF POWDERED OXIDIZER TO A COMBUSTION CHAMBER FOR A REACTION MOTOR Patent Application
Leon M. Delionback and Richard M. Stein, inventors (to NASA) Filed 5 Dec 1978 15 p
A propellant delivery subsystem adapted to concurrently supply streams of powdered fuel and fluidized oxidizer includes one reservoir for powdered fuel and a second for powdered oxidizer. The particle size for the powdered fuel and powdered oxidizer is such that 99% will pass through a 100-235 mesh screen based on the Tyler 200 mesh screen system. Two flow control valves are provided in conduits connected to the reservoirs for metering streams of fuel and oxidizer flowing from the reservoirs to the combustion chamber. Injection of the powdered fuel and oxidizer is facilitated by a gas reservoir connected with the conduits for purposes of injecting the streams of fuel and oxidizer under pressure to the combustion chamber.
A power control circuit connected between a solar array and an ion thruster receives voltage and current signals from the solar array. The control circuit multiplies the voltage and current signals together to produce a power signal which is differentiated with respect to time. The differentiator output is detected by a zero crossing detector and after suitable shaping, the detector output is phase compared with a clock in a phase demodulator. An integrator receives no output from the phase demodulator when the operating point is at the maximum power but is driven toward the maximum power point for non-optimum operation. A ramp generator provides minor variations in the beam current reference signal produced by the integrator in order to obtain the first derivative of power.

A method is described for forming the interior of a nozzle having uneven walls so that a throat of smooth converging and diverging sides is provided for passing flow. A metallic insert material is placed within the flow passageway adjacent to the area where the sharper throat constriction is to be formed, so that the material will flow through the inlet into the throat space when liquefied.

A pure fluid thrust control system is described for a pump-fed regeneratively cooled liquid propellant rocket engine. A proportional fluid amplifier and a bistable fluid amplifier control overshoot in the starting of the engine and take it to a predetermined thrust. An ejector type pump is provided in the line between the liquid hydrogen rocket nozzle heat exchanger and the turbine driving the fuel pump to aid in bringing the fluid at this point back into the regular system when it is not bypassed. The thrust control system is intended to function in environments too severe for mechanical controls.
A high number of liquid oxygen and gaseous hydrogen orifices per unit area are provided in an injector head designed to give intimate mixing and more thorough combustion. The injector head comprises a main body portion, a cooperating plate member as a flow chamber for one propellant, a cooperating manifold portion for the second propellant, and an annular end plate for enclosing an annular propellant groove formed around the outer edge of the body. All the openings for one propellant are located at the same angle with respect to a radial plane to permit a short combustion chamber.

A method and technique for installing light-weight fragile, high-temperature fiber insulation is described. Light-weight insulation batting such as alumina/zirconia or preferably saffil high-temperature insulation alumina fiber is precut into oversize elongated shapes. These shapes are saturated in an acrylic polymer resin in water solution and compressed in a mold to the required thickness or cross-sectional dimensions. The saturated batting is then dried in the mold and the resin cured at an appropriate temperature. The resulting rigidized batting may then be matched to a particular required shape and required dimensions for installation in wire-mesh sleeving or any cavity requiring the heat-barrier seal to be provided. The entire assembly is subsequently heated to a temperature much greater than the resin curing temperature to effect a clean burn-off of the resin material, leaving the original mineral batting material to expand into the interior shape of the containing cavity or wire-mesh sleeving if the insulation material is to be used as a heat seal around an openable door or hatch of a recoverable space vehicle.
N79-17916* National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio

METHOD OF MAKING BEARING MATERIALS Patent


A method is described for making a composite material which provides low friction surfaces for materials in rolling or sliding contact. The composite material which is self-lubricating and oxidation resistant up to and in excess of about 930°C is comprised of a metal component which lends strength and elasticity to the structure and a fluorine salt component which provides oxidation protection to the metal but may also enhance the lubrication qualities of the composite.

Official Gazette of the U.S. Patent Office

25 INORGANIC AND PHYSICAL CHEMISTRY

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

For related information see also 77 Thermodynamics and Statistical Physics

N79-10162* National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

PROCESS FOR THE PREPARATION OF CALCIUM SUPEROXIDE Patent
E Vernon Bailou (San Jose State Univ Calif) Peter C Wood (San Jose State Univ Calif) Theodore J Wydeven and Leroy A Spitze inventors (to NASA) (San Jose State Univ Calif) Issued 18 Jul 1978 13 p Filed 11 Jul 1977 Supersedes N77-29252 (15-20 p 2645)


Calcium superoxide is prepared in high yields by spreading a quantity of calcium peroxide diperoxidehydrate on the surface of a container, positioning said container in a vacuum chamber, on a cold surface, backfilling the chamber with a dry inert gas and finally recovering the calcium superoxide produced.

Official Gazette of the U.S. Patent Office

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

PORTABLE ELECTROPHORESIS APPARATUS USING MINIMUM ELECTROLYTE Patent
Mario R Stevens (JPL) and John Michael Vickers, inventors (to NASA) (JPL) Issued 13 Jan 1976 5 p Filed 15 Oct 1973 Sponsored by NASA


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

Official Gazette of the U.S. Patent Office

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

OZONATION OF COOLING TOWER WATERS Patent
Application
Marshall F Humphrey (JPL) Kenneth R French (JPL) and Ronald

This invention relates to inhibition of corrosion and algae in heat exchange water streams. The previously used chromium additives did little to prevent biological growth and though effective and inexpensive in protecting metals from corrosion, its use was restricted due to environmental problems. Ozone was utilized at low levels in conjunction with other additives to control bacteria and microorganisms.

N79-10168* National Aeronautics and Space Administration Pasadena Office, Calif

A PROCESS FOR CONVERTING AMORPHOUS TO CRYSTALLINE SILICON WITH ATTENDANT PURIFICATION Patent Application

The invention relates to a process for converting amorphous to crystalline silicon with attendant purification. The invention is embodied in a process wherein amorphous silicon is heated to a temperature above approximately 730 deg in vacuo for initiating exothermic conversion of the amorphous silicon to silicon in its dendritic form accompanied by an instantaneous expulsion of impurities whereby the purity of the resultant silicon is enhanced.

N79-10169* National Aeronautics and Space Administration Pasadena Office, Calif

STARK CELL OPTOACOUSTIC DETECTION OF CONSTITUENT GASES IN SAMPLE Patent Application
Jack S Margolis (JPL) and Michael S Shumate inventors (to NASA) (JPL) Filed 31 Aug 1978 14 p (Contract NAS7-100) (NASA-Case-NPO-14342-1 US-Patent-App-SN-938297) Avail NTIS HC-A02/MF A01 CSCL 07D

The invention relates to an improved optoacoustic detector and a method of using such an improved detector with a multiline laser for determining the concentration of parts per million of each concentration.

N79-11151* National Aeronautics and Space Administration Pasadena Office, Calif

COMBUSTER Patent

A combuster is provided for utilizing a combustible mixture containing fuel and air to heat a load fluid such as water or air in a manner that minimizes the formation of nitrogen oxide. The combustible mixture passes through a small diameter tube where the mixture is heated to its combustion temperature while the load fluid flows past the outside of the tube to receive heat. The tube is of a diameter small enough that the combustible mixture cannot form a flame and yet is not subject to wall quench so that combustion occurs but at a temperature less than under free flame conditions. Most of the heat required for heating the combustible mixture to its combustion temperature is obtained from heat flow through the walls of the pipe to the mixture.

N79-11152* National Aeronautics and Space Administration Pasadena Office, Calif

SURFACTANT-ASSISTED LIQUEFACTION OF PARTICULATE CARBONACEOUS SUBSTANCES Patent

A slurry of carbonaceous particles such as coal containing an oil soluble polar substituted oleophilic surfactant suitably an amine substituted long chain hydrocarbon is liquefied at high temperature and high hydrogen pressure. The pressure of surfactant results in an increase in yield and the conversion product contains a higher proportion of light and heavy oils and less asphaltene than products from other liquefaction processes.

Official Gazette of the U S Patent Office
A self-supporting sheet structure comprising a water soluble, non-cross-linked polymer, such as polyvinyl alcohol, is reported which is capable of being cross-linked by reaction with hydrogen atom radicals and hydroxyl molecule radicals in an aqueous solution having a pH of less than 8 and containing a dissolved salt in an amount sufficient to prevent dissolution of the non-cross-linked polymer. The aqueous solution is then irradiated with ionizing radiation to form hydrogen atom radicals and hydroxyl molecule radicals. The irradiation is continued for a time sufficient to produce a water-insoluble polymer sheet structure. The method has particular application in the production of battery separators and electrode envelopes for alkaline batteries.

N79-14173* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
CROSS-LINKED POLYVINYL ALCOHOL AND METHOD OF MAKING SAME Patent Application
Li-Chen Hsu Dean W Heibley, and Warren H Philipp inventors (to NASA) Filed 20 Dec 1978 12 p
N79-14174* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
IN SITU CROSS-LINKING OF POLYVINYL ALCOHOL Patent Application
W H Philipp, L C Hsu and D W Sheibley inventors (to NASA) Filed 20 Dec 1978 13 p

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

N79-18943* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
PREPARATION OF MONOTECTIC ALLOYS HAVING A
CONTROLLED MICROSTRUCTURE BY DIRECTIONAL SOLIDIFICATION UNDER DOPANT-INDUCED INTERFACE BREAKDOWN Patent Application
Richard A Parr, Mary H Johnston, and John C McClure inventors (to NASA) Filed 29 Dec 1978 19 p

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

HOT ZONE HOT ZONE HOT ZONE
COLD SINK COLD SINK COLD SINK

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

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

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

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

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

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

Flame and temperature resistant polyimide foams are prepared by the reaction of an aromatic dianhydride (pyromellitic dianhydride) with an aromatic polyisocyanate (polyethylene polyphenylisocyanate), in the presence of an inorganic acid and furfuryl alcohol. Usable acids include dilute sulfuric acid, dilute nitric acid, hydrochloric acid, polyphosphoric acid, and phosphoric acid with the latter being preferred. The dianhydride and the isocyanate in about equimolar proportions constitute about 50% of the reaction mixture, the rest being made up with the acid and the alcohol in a ratio of about 1:10. An exothermic reaction between the acid and the alcohol provides the heat necessary for the other components to polymerize without recourse to external heat sources. The mixture can be sprayed on any surface to form polymeric foam in locations where the application of heat is not practical or possible for instance between walls or on mine tunnel surfaces.

N79-11216*# National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio
MODIFICATION OF THE ELECTRICAL AND OPTICAL PROPERTIES OF POLYMERS Patent Application
M J Mirtich and James S Sovey inventors (to NASA) Filed 7 Nov 1978 11 p
The surface of a polymer is irradiated to modify the optical and electrical properties as well as to change the surface morphology. A polymer is placed in a vacuum of about $4 \times 10^{-5}$ torr. A surface of the polymer is exposed to a beam of argon ions having an energy between 500 and 1000 eV and an ion beam current density between 0.1 and 1.0 mA/sq cm. The resulting texturing of the surface causes a large decrease in spectral transmittance at all wavelengths. The surface conductivity of the polymer is also increased. The textured surface further enhances the adherence of thin films to the polymer. A polyimide, (Kaplan) and a fluorinated ethylene propylene (Teflon) are surface treated in accordance with the invention.

**N79-12221** National Aeronautics and Space Administration

Lyndon B Johnson Space Center, Houston, Tex.

**THERMAL INSULATION ATTACHING MEANS** Patent

Lubert J Leger, inventor (to NASA) Issued 7 Nov 1978 5 p

Filed 12 Apr 1977 Supersedes N7731237 (15 - 22, p 2908)


US-Patent-Class-244-121 US-Patent-Class-244-158.

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

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

**Cermet compositions having high temperature oxidation resistance, high hardness and high abrasion and wear resistance and particularly adapted for production of high temperature resistant cermet insulator bodies are presented. The compositions are comprised of a sintered body of particles of a high temperature resistant metal or metal alloy preferably molybdenum or tungsten particles, dispersed in and bonded to a solid solution formed of aluminum oxide and silicon nitride and particularly a ternary solid solution formed of a mixture of aluminum oxide, silicon nitride and aluminum nitride. Also disclosed are novel ceramic compositions comprising a sintered solid solution of aluminum oxide, silicon nitride and aluminum nitride.**

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

**N79-14214** National Aeronautics and Space Administration

Ames Research Center, Moffett Field, Calif.

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

Martin Hudis (Allis-Chalmers, Milwaukee) and Theodore Wydeven, inventors (to NASA) Issued 2 Jan 1979 8 p

Filed 11 Feb 1977 Supersedes N77-17245 (15 - 08, p 1010)

Division of abandoned US Patent Appl SN-589172 filed 23 Jun 1975


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

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

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

OXYGEN POST-TREATMENT OF PLASTIC SURFACE COATED WITH PLASMA POLYMERIZED SILICON-CONTAINING MONOMERS Patent
Theodore J. Wydeven and John R. Holloran Jr., inventors (to NASA) Issued 31 Dec 1968 2 p Filed 3 Jun 1966


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

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N79-18053* National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif.

N79-18054* National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif.

MIXED DIAMINES FOR LOWER MELTING ADDITION POLYIMIDE PREPARATION AND UTILIZATION Patent
Terry L. St Clair, inventor (to NASA) Application 13 Feb 1979 12 p

(Contract NAS7-100) (NASA-Case-NPO-14477-1, US-Patent-Appl-SN-951830) Avail NTIS HC A02/MF A01 CSCL 211

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

NASA

N79-18055* National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif.

N79-18056 National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif.

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters and oxidizers, storage and handling and aircraft fuels
For related information see also 07 Aircraft Propulsion and Power 20 Spacecraft Propulsion and Power and 44 Energy Production and Conversion

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

MIXED DIAMINES FOR LOWER MELTING ADDITION POLYIMIDE PREPARATION AND UTILIZATION Patent Application
Terry L. St Clair, inventor (to NASA) Application 13 Feb 1979 12 p

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

NASA
rate of these propellants is increased by about 5 to 10% providing improved ballistic performance NASA

N79-10225* National Aeronautics and Space Administration Pasadena Office Calif
RECOVERY OF ALUMINUM AND BINDER FROM COMPOSITE PROPELLANTS Patent Application
Graham C Shaw inventor (to NASA) (Thiokol Chemical Corp Brigham City Utah) Filed 29 Sep 1978 14 p
The metal fuel powder and the resin are recovered from propellant binder containing less than 15% oxidizer salt by dissolution of the binder in an active transsterification solvent such as an alcoholic solution of an alkali metal alkoxide of the formula MOR where M is an alkali metal suitably sodium or potassium and R is an alkyl group containing 1 to 6 carbon atoms. The alcohol is an alkanol containing 1 to 6 carbon atoms. When moisture is excluded from the system the highly basic alkyl oxide radical has little effect upon the Al present but reacts very rapidly with the binder. Mixed solvents of either methyl alcohol and tetrahydrofuran or toluene were effective in the transsterification reactions. The products of the reaction were soluble in toluene. Washing the binder from the Al generally resulted in the recovery of 98.7 to 99.7% of the theoretical amount. Analysis for active aluminum content ranged from 98.5 to 98%. The low oxidizer aluminum-binder residue is obtained by an aqueous leach of the scrap propellant NASA

N79-10227* National Aeronautics and Space Administration Pasadena Office Calif
PROCESS FOR THE LEACHING OF AP FROM PROPELLANT Patent Application
Graham C Shaw (Thiokol Corp Brigham City Utah) and Meldon McIntosh inventors (to NASA) (Thiokol Corp Brigham City Utah) Filed 29 Sep 1978 17 p
The invention relates to a method of recovery of inorganic oxidizing salt such as ammonium perchlorate (AP) from waste propellant. In a method of recovery of AP by leaching the chunks agglomerate requiring continuous high energy mixing. In the invention the agglomeration of the propellant is prevented by the addition of surface active agents which are absorbed upon the propellant binder surfaces reducing the tacky nature of the exposed surfaces. The power required to mix the water slurred propellant was less than 1/50th that required to mix the pyrotechnic materials having the tacky nature of the wet agglomerated propellant and not containing the dispersing agent. Extraction of up to 98% AP was achieved from slurries containing over 40% propellant. The chemical purity of the recovered AP is acceptable for reuse in propellant compositions for resale or for use in slurred explosives NASA

N79-11231* National Aeronautics and Space Administration Pasadena Office Calif
ELECTROEXPLOSIVE DEVICE Patent
Vincent J Menichelli inventor (to NASA) (JPL) Issued 1 Aug 1978 7 p Filed 8 Nov 1976 Supersedes N77-17258 (15 - 08 p 1012) Sponsored by NASA
An electroexplosive device is presented which employs a header having contact pins hermetically sealed with glass passing through from a connector end of the header to a cavity filled with a shunt layer of a new nonlinear resistive composition and a heat-sink layer of a new dielectric composition having good thermal conductivity and capacity. The nonlinear resistive layer and the heat-sink layer are prepared from materials by mixing with a low temperature polymerizing resin. The resin is dissolved in a suitable solvent and later evaporated. The resultant solid composite is ground into a powder press formed into the header and cured (polymerized) at about 250 to 300 F. Official Gazette of the U S Patent Office

N79-14228* National Aeronautics and Space Administration Pasadena Office Calif
INHIBITED SOLID PROPELLANT COMPOSITION CONTAINING BERYLLIUM HYDRIDE Patent
Wallace W Thompson inventor (to NASA) (JPL) Issued 5 Sep 1978 3 p Filed 5 Aug 1969 Sponsored by NASA
An object of this invention is to provide a composition of beryllium hydride and carboxy-terminated polybutadiene which is stable. Another object of this invention is to provide a method for inhibiting the reactivity of beryllium hydride toward carboxy-terminated polybutadiene. It was found that a small amount of lecithin inhibits the reaction of beryllium hydride with the acid groups in carboxy-terminated polybutadiene Official Gazette of the U S Patent and Trademark Office

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

N79-10245* National Aeronautics and Space Administration Pasadena Office Calif
AN IMPROVED SYSTEM FOR SLICING SILICON WAFERS Patent Application
Earl R Collins inventor (to NASA) Filed 16 Oct 1978 17 p (Contract NAS7-100)
A system is presented for simultaneously slicing from a plurality of silicon boules arranged in side-by-side relation a multiplicity of high-grade wafers for use in the semiconductor industry. The system includes a plurality of band saw blades supported for simultaneous unidirectional displacement along
parallel courses extending through a common cutting station. The blades are provided with serrations, the purpose of which is to transport a cutting slurry picked-up at jets for enhancing the cutting operation. Each of the blades is supported at the cutting station by a plurality of guides driven in rotation in a manner such that the guides are angularly displaced through 180 degrees during each cutting operation for continuously presenting to the blade regenerated supporting surfaces whereby blade wobble is reduced.

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**N79-11246**

National Aeronautics and Space Administration

**NOZZLE EXTRACTION PROCESS AND HANDLEMETER FOR MEASURING HANDLE** Patent


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

Official Gazette of the U S Patent Office

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**N79-10246**

National Aeronautics and Space Administration

**SUPPORT ASSEMBLY FOR CRYOGENICALLY COOLABLE LOW-NOISE CHOKE WAVEGUIDE** Patent Application

Frank E. McCrea inventor (to NASA) (JPL) Filed 31 Aug 1978 11 p (Contract NAS7-100)


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

NASA

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**N79-11249**

National Aeronautics and Space Administration

**METHOD AND TOOL FOR MACHINING A TRANSVERSE SLOT ABOUT A BORE** Patent Application

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


A machining tool is described for cutting transverse slots in solid rocket motor casings. The cutting tool mounted on a milling machine is positioned into the bore of a rocket motor by a vertical feed mechanism. The rocket motor mounted on a rotating table is rotated as the cutting head is tightly held against the wall.
31 ENGINEERING (GENERAL)

shaft by tensioned cable is moved transversely into the wall to cut a slot. Maximum slot depth is reached when the shaft of the tool is in proximity to the wall of the bore. To increase slot depth machining ends the cable is slackened and the tool is backed off to allow the insertion of another spacer. The cable is tightened and the steps of cutting, backing off, and adding spacers are repeated until the desired depth of the slot is reached.

N79-18087* National Aeronautics and Space Administration
Ames Research Center Moffett Field Calif
CRYOGENIC CONTAINER COMPOUND SUSPENSION STRAP Patent Application
John W. Vorreiter inventor (to NASA) Filed 22 Aug 1978
NTIS HC A02/MF A01 CSCL 20L
A support strap for use in a cryogenic storage vessel for supporting the inner shell from the outer shell with a minimum heat leak is presented. The compound suspension strap is made from a unidirectional fiberglass epoxy composite material with an ultimate tensile strength and fatigue strength which are approximately doubled when the material is cooled to a cryogenic temperature.

N79-20283* National Aeronautics and Space Administration
Pasadena Office Calif
LOW COST CRYOSTAT Patent Application
James B. Stephens, inventor (to NASA) JPL Filed 29 Mar 1979
20 p (Contract NAS7-100)
Avail
NTIS HC A02/MF A01 CSCL 20L
An improved cryostat for use in a low or a substantially gravity-free environment adapted to cool an experiment through the use of helium II, or helium in its super fluid state is described. The cryostat is characterized by interchangeable daughter dewars and helium supply, and a mother dewar connected to a low pressure venting system for converting helium I to a super fluid state for use as a primary cryogen. Each daughter dewar is adapted to be removably mounted in mated relation on the mother dewar and has support for an experiment package a source of helium to be employed as a secondary cryogen, and a heat pipe adapted to be extended into the mother dewar for facilitating cooling of the secondary cryogen. A transfer of heat from the package to the primary cryogen, (via the secondary
cryogen) is accommodated as a film flow of helium II progresses from the heat pipe to the experiment dewar. NASA gas and terminates in a reverse bend to prevent backflow of liquid through the pipe. A R H

N79-21226* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
METHOD AND APPARATUS FOR PREPARING MULTICONDUCTOR CABLE WITH FLAT CONDUCTORS Patent
A method and apparatus for preparing flat conductor cable having a plurality of ribbon-like conductors disposed upon and adhesively bonded to the surface of a substrate is described. The conductors are brought into contact with the substrate surface, and while maintained in axial tension on said substrate, the combination is seated on a yieldably compressible layer to permit the conductor to become embedded into the surface of the substrate film.

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

N79-21225* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
LOW HEAT LEAK CONNECTOR FOR CRYOGENIC SYSTEM Patent
Heat leak from the surrounding atmosphere during fluid transfer from a spaced shell-insulated vessel for storing liquefied gas having an upper gaseous phase is minimized by forming a relatively wide shallow blister on the wall of the vessel at the point of transfer line connection. The shell and the opposed walls of the blister have aligned openings whose common axis passes centrally through the blister and is normal to the surfaces of the vessel and shell. A fluid transfer line conduit passing through the shell opening is in fluid-tight connection with the shell and blister wall. The fluid transfer line confines the fluid in a continuous stream. The blister is filled with a heat insulating material which provides a thermal break between the central wall portions of the blister. A connector at the bottom of the vessel comprises a tube extending between the openings in the blister which projects a short distance within the body of liquefied
N79-21227* National Aeronautics and Space Administration Marshall Space Flight Center Huntsville, Ala
EDGE COATING OF FLAT WIRES Patent
Official Gazette of the U.S. Patent Office

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

N79-10263* National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston Tex
BIT ERROR RATE MEASUREMENT ABOVE AND BELOW BIT RATE TRACKING THRESHOLD Patent
Official Gazette of the U. S. Patent Office

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

N79-10262* National Aeronautics and Space Administration Pasadena Office Calif
AUTOMATIC COMMUNICATION SIGNAL MONITORING SYSTEM Patent
Official Gazette of the U.S. Patent Office

A system is presented for automatic monitoring of a communication signal in the RF or IF spectrum utilizing a superheterodyne receiver technique with a VCO to select and sweep the frequency band of interest. A first memory is used to store one band sweep as a reference for continual comparison with subsequent band sweeps. Any deviation of a subsequent band sweep by more than a predetermined tolerance level produces an alarm signal which on being triggered the band sweep data temporarily stored in one of two buffer memories to be transferred to long-term store while the other buffer memory is switched to its store mode to assume the task of temporarily storing subsequent band sweeps.
An FM/CW radar system is presented with improved noise discrimination in which the received signal is multiplied by a sample of the transmitted signal and the product signal is employed to deflect a laser beam as a function of frequency. The position of the beam is thus indicative of a discrete frequency and it is detected by the frequency encoded positions of an array of photodiodes. The outputs of the photodiodes are scanned, then threshold detected, and used to obtain the range and velocity of a target.

Several new and useful improvements in steering and control of phased array antennas having a small number of elements typically on the order of 5 to 17 elements are provided. Among the improvements are increasing the number of beam steering positions, reducing the possibility of phase transients in signals received or transmitted with the antennas, and increasing control and testing capacity with respect to the antennas.

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


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

DIGITAL DEMODULATOR-CORRELATOR Patent


An apparatus for demodulation and correlation of a code modulated 10 MHz signal is presented. The apparatus is comprised of a sample and hold analog-to-digital converter synchronized by a frequency coherent 40 MHz pulse to obtain four evenly spaced samples of each of the signal. Each sample is added or subtracted to or from one of four accumulators to or from the separate sums. The correlation functions are then computed. As a further feature of the invention multipliers are each multiplied by a squarewave chopper signal having a period that is long relative to the period of the received signal to foreclose contamination of the received signal by leakage from either of the other two terms of the multipliers.

CONICAL SCAN TRACKING SYSTEM EMPLOYING A LARGE ANTENNA Patent


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

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AZIMUTH CORRELATOR FOR REAL-TIME SYNTHETIC APERTURE RADAR IMAGE PROCESSING Patent

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

DISCRIMINATOR AIDED PHASE LOOK ACQUISITION FOR SUPPRESSED CARRIER SIGNALS Patent Application

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

RADIO FREQUENCY ARRAYING METHOD FOR RECEIVERS Patent Application

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

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

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

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

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

An S-band modulator capable of providing both linear phase and quadrature shift key (QPSK) modulation for a transponder in a tracking and data relay satellite system is described. A QPSK modulator and a linear modulator are combined using separate branches out of a power divider for the two modulating functions and combining the outputs of the two branches by an upconverter in order to allow QPSK modulation at a fraction (typically one-eighth) of the transmitter frequency. The linear phase modulator operates at the lower frequency of the QPSK modulator with a multiplier following the linear phase modulator to increase the output of the linear phase modulator to a frequency necessary as an input to the up-converter to produce the desired transmitter output frequency. When the linear modulator is being used, the QPSK modulator can be used with a PN code to spread the linear phase modulator but in either case the up-converter produces the same signal as if the QPSK modulator had been placed in series with the linear modulator. A significant amount of multiplication follows to maintain low modulation deviation and good linearity.

An antenna array for communicating circularly polarized electromagnetic radiation is described. A pair of open ended antenna cavities is coaxially constructed and operates by excitation of linear radiation elements arranged within each of the cavities. A pair of crossed-dipole radiation devices is centered with the cavity and operated by means of a phase-shifting network circuit to transmit as well as receive circularly polarized radiation. Four monopole radiation devices are symmetrically arranged to operate...
in the outer cavity in phase quadrature by means of the phase-shifting network circuit to also transmit and receive circularly polarized radiation. Combined operation of the two antenna cavities with a 180° phase differential between the fields related to the two cavities provides a broad beam, relatively wide frequency bandwidth communication capability. Particular embodiments disclosed feature a generally square cavity array as well as a circular cavity array.

**N79-19195**
National Aeronautics and Space Administration
Pasadena Office, Calif
MULTIBEAM SINGLE FREQUENCY SYNTHETIC APERTURE RADAR PROCESSOR FOR IMAGING SEPARATE RANGE SWATHS Patent Application
Atul Jain, inventor (to NASA) (JPL) Filed 6 Mar 1979 16 p (Contract NAS7-100)
A method and apparatus are described for single frequency multibeam imaging of multiple strips of range swath at high range intervals for those applications where it is desirable to cover a range swath much greater than is possible for a given interpulse interval. Data from a single frequency synthetic aperture radar (in which beam parameters are adjusted so that the return from each successive swath is received during successive interpulse periods) are separated in Doppler frequency for the return from each beam at the frequency plane of the processor. Alternatively, the image formed by each beam may be spatially separated in the azimuth direction and successively selected by positioning an appropriate slit in the recording plane of the processor.

**N79-20297**
National Aeronautics and Space Administration
Lyndon B Johnson Space Center Houston Tex
INTERACTIVE COLOR DISPLAY FOR MULTISPECTRAL IMAGERY USING CORRELATION CLUSTERING Patent
A method for processing multispectral data is provided, which permits an operator to make parameter level changes during the processing of the data. The system is directed to production of a color classification map on a video display in which a given color represents a localized region in multispectral feature space. Interactive controls permit an operator to alter the size and change the location of these regions, permitting the classification of such region to be changed from a broad to a narrow classification.


**33 ELECTRONICS AND ELECTRICAL ENGINEERING**

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

**N79-10337** National Aeronautics and Space Administration
John F Kennedy Space Center Cocoa Beach Fla

**LIGHTNING CURRENT WAVEFORM MEASURING SYSTEM Patent**

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

Official Gazette of the U S Patent Office

**N79-10339** National Aeronautics and Space Administration
Lewis Research Center Cleveland Ohio

**TRAVELING WAVE TUBE CIRCUIT Patent**

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

Official Gazette of the U S Patent Office

**N79-10338** National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md

**TIME DOMAIN PHASE MEASURING APPARATUS Patent**

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

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

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

Official Gazette of the U S Patent Office

SPACE-CHARGE LIMITED SOLID-STATE TRIODE Patent

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

Official Gazette of the U S Patent Office

COMPLEMENTARY DMOS-VMOS INTEGRATED CIRCUIT STRUCTURE Patent

A high speed CMOS formed on a single semiconductor substrate includes a DMOS having an asymmetric channel and a VMOS with a relatively short channel length. The short channel length of the VMOS is achieved by forming a double diffusion along one edge of a V groove or by implanting boron into the apex of the V groove and diffusing a single layer to a relatively deep depth along both edges of the groove.

Official Gazette of the U S Patent and Trademark Office
LIGHTWEIGHT ELECTRICALLY-POWERED FLEXIBLE THERMAL LAMINATE Patent


Cross-layered woven or unwoven yarns are used to provide an active thermal control mechanism for spacecraft use. One set of yarns is composed of flexible electrically conductive metal fibers which are capable of being resistance heated by the application of voltage. Another set of yarns, nonconductive and flexible, provide mechanical strength and preclude the passage of electrical current between the metal yarns by virtue of the spacing between them. A lightweight electrically nonconductive film is bonded to the cross-layered yarns to protect the metal yarns from the elements (minimize electrical shorts from moisture), to provide additional strength to the fabric, and to prevent conductive loss of heat in nonvacuum applications. The nonconductive film is metallized on its obverse side to provide a more uniform heat load distribution.

PORTABLE APPLIANCE SECURITY APPARATUS Patent Application


The present invention relates to a heavy gauge case into which a hand-held computer or other portable appliance is locked for theft prevention. The case has a rear access opening that is enclosed by a back plate and secured to a desk top or other stationary object by a hold-down cable.
material is positioned closely adjacent to the electrically conductive member so that the magnetic field produced by current flowing through said electrically conductive member disturbs a portion of the recorded electrical signal directly proportional to the intensity of the lightning strike.

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

N79-14308* National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md

A SYSTEM FOR DISPLAYING AT A REMOTE STATION DATA GENERATED AT A CENTRAL STATION AND FOR POWERING THE REMOTE STATION FROM THE CENTRAL STATION Patent Application
James C Perry, inventor (to NASA) Filed 30 Nov 1978 19 p
(NASA-Case-GSC-12411-1 US-Patent-895367) Avail NTIS HC A02/MF A01 CSCL 09C

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

NASA CONTROL
LOGIC

Circuit diagram

N79-17133* National Aeronautics and Space Administration
Marshall Space Flight Center Huntsville Ala

DIRECT CURRENT TRANSFORMER Patent

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

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

A method for making electrical connections to conductive thin film coatings deposited on a substrate is described. The method involves the steps of wetting a portion of the coating with an indium and metal alloy in which the metal has a resistivity in the range of about 1.5 to 20 microhm-cm at about 20 degrees Celsius and attaching an electrically conductive lead to the alloy. The alloy may include about 90 percent indium and about 10 percent silver or about 50 percent indium and 50 percent tin.

The development consists of a numerically controlled oscillator for and method of controlling the frequency and phase of an output signal in response to an input control word indicating an adjustment, which may be either a positive or negative adjustment to be made in the output signal. The translated input control word is then accumulated using a clock which is offset from the desired level. When the threshold is exceeded the phase and thus ultimately the frequency of the output signal is adjusted in a single direction in response to the translated control word.
The key simplification results from virtual addition of a bias so as to require only carries and never borrows.
An improved motor speed and torque controller was invented for brushless DC motors which provides an unusually smooth torque control arrangement. The controller provides a means for controlling a current waveform in each winding of a brushless DC motor by synchronization of an excitation pulse train from a programmable oscillator. Sensing of torque for synchronization is provided by a light beam chopper mounted on the motor rotor shaft. Speed and duty cycle are independently controlled by controlling the frequency and pulse width provided so that current transitions from one motor winding to another is effected without abrupt changes in output torque.

A capacitor in which one plate or electrode element is vibratable to achieve a variation in capacitance is described. The capacitor includes two spaced stationary elements. The third element is supported at its center and in the form of a diaphragm which is vibrated at its inherent mechanical resonant frequency to achieve a corresponding variation in capacitance between one of the stationary elements and the vibrating diaphragm.

A fluid velocity measuring device is described which when placed in a freestream fluid flow, causes vortices to be formed at a frequency proportional to the flow rate of the fluid. Sensors on the device generate electric signals with frequency proportional to the rate of vortex creation and with relative mean amplitudes indicative of fluid flow direction. Electric circuitry translates the electric signals into indications of fluid speed and direction.
HEAT EXCHANGER Patent
A heat exchanger, as exemplified by a rocket combustion chamber, is constructed by stacking thin metal rings having microsized openings therein at selective locations to form cooling passages defined by an inner wall, an outer wall and fins. Suitable manifolds are provided at each end of the rocket chamber. In addition to the cooling channel openings, coolant feed openings may be formed in each of rings. The coolant feed openings may be nested or positioned within generally U-shaped cooling channel openings. Compression on the stacked rings may be maintained by welds or the like or by bolts extending through the stacked rings.

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

METHOD AND TURBINE FOR EXTRACTING KINETIC ENERGY FROM A STREAM OF TWO-PHASE FLUID Patent
An axial flow separator turbine is described which includes a number of nozzles for delivering streams of a two-phase fluid along linear paths. A phase separator which respectively separates the vapor and liquid is characterized by concentrically related annuli supported for rotation within the paths. The separator has endless channels for confining the liquid under the influence of centrifugal forces. A vapor turbine fan extracts kinetic energy from the liquid. Angular momentum of both the liquid phase and the vapor phase of the fluid is converted to torque.
A HEAT EXCHANGER AND METHOD OF MAKING Patent Application
A Fortmi and John M. Kazaroff, inventors (to NASA) Filed 30 Nov 1977 14 p
A heat exchanger of increased effectiveness is described. A porous metal matrix is disposed in a metal chamber or between walls through which a heat-transfer fluid is directed. The porous metal matrix has internal bonds and is bonded to the chamber in order to remove all thermal contact resistance within the composite structure. A specific use is to provide a method of making a rocket chamber with maximum heat transfer at the throat area where inner wall temperatures are the highest.

METHOD OF OBTAINING INTENSIFIED IMAGE FROM DEVELOPED PHOTOGRAPHIC FILMS AND PLATES Patent
Barbara S. Askins, inventor (to NASA) Issued 18 Jul 1978 8 p Filed 9 Jun 1976 Supersedes N76-26449 (14 - 17 p 2189)
A method is explained of obtaining intensified images from silver images on developed photographic films and plates. The steps involve converting silver of the developed film or plate to a radioactive compound by treatment with an aqueous alkaline solution of an organo-S35 compound, placing the treated film or plate in direct contact with a receiver film which is then exposed by radiation from the activated film, and developing and fixing the resulting intensified image on the receiver film.

SURFACE ROUGHNESS MEASURING SYSTEM Patent
Atul Jam, inventor (to NASA) Issued 18 Jul 1978 15 p Filed 24 Nov 1976 Supersedes N77-17325 (15 - 08 p 1020)
Significant height information of ocean waves or peaks of rough terrain is obtained by compressing the radar signal over different widths of the available chirp or Doppler bandwidths and cross-correlating one of these images with each of the others. Upon plotting a fixed (e.g. zero) component of the cross-correlation values as the spacing is increased over some empirically determined range, the system is calibrated. To measure height with the system, a spacing value is selected and a cross-correlation value is determined between two intensity images at a selected frequency spacing. The measured height is the slope of the cross-correlation value used. Both electronic and optical radar
signal data compressors and cross-correlations are disclosed for implementation of the system

A cylindrically shaped enclosure has a source of alpha particles at one end and detectors mounted in tandem at the other end. Two downward-extending baffles and a blocking shield define a forward-scattering angular range in which scattering products from alpha particle/hydrogen and alpha particle/helium collisions can reach the detector's surface. The thickness of the detectors is sized so that alpha particles resulting from alpha particle helium collisions are absorbed in the first detector and recoil protons resulting from alpha particles/hydrogen collisions pass through the first detector and are absorbed by the second detector. Each scattering product is identified from its ability to penetrate or not penetrate a detection material of predetermined thickness. The output pulses are processed by an electronic processing system. The apparatus could be carried by a planetary probe to one of the outer planets.
**N79-14346** National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

**THERMOCOUPLES OF MOLYBDENUM AND IRIDIUM ALLOYS FOR MORE STABLE VACUUM-HIGH TEMPERATURE PERFORMANCE** Patent

Thermocouples providing stability and performance reliability in systems involving high temperatures and vacuums by employing a bimetallic thermocouple sensor are described. Each metal of the sensor is selected from a group of metals comprising molybdenum and indium and alloys containing only those two metals. The molybdenum, indium thermocouple sensor alloys provide bare metal thermocouple sensors having advantageous vapor pressure compatibility and performance characteristics. The compatibility and physical characteristics of the thermocouple sensor alloys result in improved emf, temperature properties and thermocouple hot junction performance.

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**N79-14345** National Aeronautics and Space Administration

**ELECTRONICALLY SCANNED PRESSURE SENSOR MOD-**

**ULE WITH IN SITU CALIBRATION CAPABILITY** Patent
Chris Gross, inventor (to NASA) Issued 5 Sep 1978 10 p Filed 22 Sep 1977 Supersedes N77-28395 (15 - 19, p 0183)

This high data rate pressure sensor module helps reduce energy consumption in wind tunnel facilities without loss of measurement accuracy. The sensor module allows for nearly a two order of magnitude increase in data rates over conventional electromechanically scanned pressure sampling techniques. The module consists of 16 solid state pressure sensor chips and signal multiplexing electronics integrally mounted to a four position pressure selector switch. One of the four positions of the pressure selector switch allows the in situ calibration of the 16 pressure sensors, the three other positions allow 48 channels (three sets of 16) pressure inputs to be measured by the sensors. The small size of the sensor module will allow mounting within many wind tunnel models thus eliminating long tube lengths and their corresponding slow pressure response.

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**N79-14347** National Aeronautics and Space Administration
Pasadena Office, Calif

**APPARATUS FOR PROVIDING A SERVO DRIVE SIGNAL IN A HIGH-SPEED STEPPING INTERFEROMETER** Patent
Rudolf A. Schnidler, inventor (to NASA) (JPL) Issued 2 Jan 1979 12 p Filed 6 Jun 1977 Supersedes N77-128395 (15 - 19, p 2525)

An analog voltage approximately linearly proportional to a desired offset from the present null position of a moving mirror in an interferometer is applied to the mirror moving means as the mirror moves to the next null position as determined by the analog voltage the fringes of a laser reference interference pattern are detected. At the occurrence of each fringe the analog voltage is reduced proportionally so that when the next null position is reached, this driving analog is effectively zero. A binary up/down counter by its internal count causes a digital/analog converter to supply the analog voltage to the mirror moving means. Fringe detection and direction of movement logic cause the binary up/down counter to be decremented from its offset count as the mirror is moved to the new null position. Undesirable movement of the mirror due to vibration or other sources causes a correcting drive signal to be applied to the mirror moving means that is proportional to the distance of movement.

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

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

A magnetic recording and magneto-optic playback system is disclosed wherein thermomagnetic recording is employed. A transparent isotropic film is heated along a continuous path by a focused laser beam. As each successive area of the path is heated locally to the vicinity of its Curie point in the presence of an applied magnetic field, a magneto-optic density is established proportional to the magnetic field and fixed in place as the area cools once the laser beam moves on to an adjacent area. To play back the recorded data, the intensity of the laser beam is reduced to avoid reaching the vicinity of the Curie point of the film as it is scanned by the laser beam in the same manner as for recording. A Faraday effect analyzer and photo detector are employed as a transducer for producing an output signal.
35 INSTRUMENTATION AND PHOTOGRAPHY

N79-17196® National Aeronautics and Space Administration
Pasadena Office, Calif
COOLED ECHELLE GRATING SPECTROMETER Patent
Application
Reinhard Beer inventor (to NASA) Filed 31 Oct 1978
16 p Sponsored by NASA
(Contract NAS7-100)
NTIS HC A02/MF A01 CSCL 14B
A cooled echelle grating spectrometer for detecting wave-
lengths between one micron and fifteen microns is described
More specifically a spectrometer is disclosed, having a cross-
dispersing grating for ordering infrared energy, and an echelle
grating for further ordering of the infrared energy Means are
also disclosed to direct infrared energy to the cross-dispersing
grating and then to the echelle grating. Ordered radiation from
the echelle grating is sensed by a detecting means. Means are
also provided for cooling the cross-dispersing grating, the
echelle grating, and the detecting means so that background
radiation can be minimalized In a specific embodiment the
cross-dispersing grating and echelle grating are in separate
enclosed volumes having access to each other through a single
intermediate aperture, reflected energy from the cross-dispersing
grating being focused so as to pass through the intermediate
aperture NASA

N79-19317* National Aeronautics and Space Administration
Pasadena Office, Calif
INTERFEROMETER Patent Application
James B Breckmndge, inventor (to NASA) Filed 30 Nov 1978
16 p
NTIS HC A02/MF A01 CSCL 14B
An interferometer is presented to measure slight differences
in path length of two beams and to enable comparison of the
spectrum of an unknown light source with a known source,
which is insensitive to tilting. One novel feature is the use of
largely platelike elements to form a beamsplitter, and with reflector
surfaces at the edges of the elements to provide tilt compensation
Another feature is that the outer surfaces of the plate-like elements
are angled from parallelism with the beamsplitter interface, to
avoid the effects from ghost reflections. Another feature is the
separation of the elements by a thin oil film to permit sliding
of one plate relative to the other NASA

N79-18296NIL National Aeronautics and Space Administration
Langley Research Center Hampton Va
APPARATUS FOR MEASURING AN AIRCRAFT'S SPEED
AND HEIGHT Patent
William R Young and Charles W Stump inventors (to NASA)
Issued 23 Jan 1979 7 p Filed 9 Mar 1978 Supersedes
N78-22115 (16 - 13 p 1667)
(NASA-Case-LAR-12275-1 US-Patent-4 135817
Office CSCL 14B
An apparatus for measuring aircraft horizontal speed and
height above ground without the need for airborne cooperative
devices is presented. Two ground level TV cameras separated
by a measured distance and pointed at zenith are placed in line
with the projection of the expected path of the aircraft. Speed
is determined by measuring the time that it takes the aircraft to
cross zenith as the reference points. Height is determined
by correlating the speed with the time required to cross the
field of view of either of the two cameras. Official Gazette of the U S Patent and Trademark Office
35 INSTRUMENTATION AND PHOTOGRAPHY

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

METHOD FOR APPLYING PHOTOGRAPHIC RESISTS TO OTHERWISE INCOMPATIBLE SUBSTRATES Patent
Application
Wolfgang Fuhr inventor (to NASA) (U S Radium, Parsippany, New Jersey) Filed 31 Oct 1978 11 p Sponsored by NASA
NTIS HC A02/MF A01 CSCL 14E

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

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

VOLUMETRIC DIRECT NUCLEAR PUMPED LASER
Nelson W Jalufka, Frank Hohl, Russell J DeYoung (Vanderbilt
Univ Nashville Tenn.) and Michael D. Williams, inventors (to
NASA) 28 Aug 1978 7 p Filed 19 Apr 1977 2 Supersedes
N77-21424 15 - 12 p 1591
(INASA-Case-LAR-12183-1 US-Patent-4110703
US-Patent-Class-331-94 5P
Office CSCL 20E

A volumetric direct nuclear pumped laser was developed in which the gas is a mixture of He-3 and a minority gas from
the group of argon, krypton, xenon, chlorine and fluorine. The
mixture of He-3 and the minority gas produces lasing with a
minority gas concentration of from 0.01 to 10 percent argon
1 percent krypton, 0.01 to 5 percent xenon and small concentra-
tions of chlorine or fluorine.

Official Gazette of the U S Patent and Trademark Office

36 LASERS AND MASERS
Includes parametric amplifiers

N79-14362* National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt, Md

EXTERNAL BULB VARIABLE VOLUME MASER Patent
Victor S Remhardt (Phoenix Corp McLean, Va) and Peter O
Cervenka, inventors (to NASA) (Phoenix Corp McLean, Va)
Issued 5 Dec 1978 10 p Filed 30 Nov 1977 Supersedes
N78-15474 (16 - 06, p 0763) Sponsored by NASA
US-Patent-Class-331-94 5P
Office CSCL 20E

A maser functioning as a frequency standard stable to one
part in 10 to the 14th power includes a variable volume, constant
surface area storage bulb having a fixed volume portion located
in a resonant cavity from which the frequency standard is derived
A variable volume portion of the bulb, external to the resonant
cavity, has a maximum volume on the same order of magnitude
as the fixed volume bulb portion. The cavity has a length to
radius ratio of at least 3.1 so that the operation is attained
without the need for a feedback loop. A baffle plate, between
the fixed and variable volume bulb portions includes apertures
for enabling hydrogen atoms to pass between the two bulb
portions and is an electromagnetic shield that prevents coupling
of the electromagnetic field of the cavity into the variable volume
bulb portion.

Official Gazette of the U S Patent and Trademark Office

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

GAS ION LASER CONSTRUCTION FOR ELECTRICALLY
ISOLATING THE PRESSURE GAUGE THEREOF Patent
Charles E. Wood (TRW Inc., Redondo Beach Calif) and Robert
S Witte inventors (to NASA) (TRW Inc., Redondo Beach, Calif
Issued 6 May 1975 5 p Filed 10 Sep 1973 Sponsored by
NASA
(INASA-Case-MFS-22167-1, US-Patent-3683171
US Patent and Trademark Office CSCL 20E

A gas ion laser with a pressure gauge and a gas pressure
reservoir connected to the laser through a valve is described.
The valve and the pressure gauge are electrically insulated from
the laser discharge path by connecting them in series with the
cathode of the laser. The laser cathode can be grounded and
preferably is a cold cathode although a hot cathode may be
used. The cold cathode is provided with a central aperture to
which is connected both the pressure gauge and the gas pressure
reservoir through the valve. This effectively prevents electric
discharges from passing either to the pressure gauge or the
valve which would otherwise destroy the pressure gauge.

Official Gazette of the U S Patent and Trademark Office

N79-18307* National Aeronautics and Space Administration
VOLMETRIC DIRECT NUCLEAR PUMPED LASER
Langley Research Center Hampton Va

Nelson W Jalufka, Frank Hohl, Russell J DeYoung (Vanderbilt
Univ Nashville Tenn.) and Michael D. Williams, inventors (to
NASA) 28 Aug 1978 7 p Filed 19 Apr 1977 2 Supersedes
N77-21424 15 - 12 p 1591
(INASA-Case-LAR-12183-1 US-Patent-4110703
US-Patent-Class-331-94 5P
Office CSCL 20E

A volumetric direct nuclear pumped laser was developed in
which the gas is a mixture of He-3 and a minority gas from
the group of argon, krypton, xenon, chlorine and fluorine. The
mixture of He-3 and the minority gas produces lasing with a
minority gas concentration of from 0.01 to 10 percent argon
1 percent krypton, 0.01 to 5 percent xenon and small concentra-
tions of chlorine or fluorine.

Official Gazette of the U S Patent and Trademark Office

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reservoir connected to the laser through a valve is described.
The valve and the pressure gauge are electrically insulated from
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used. The cold cathode is provided with a central aperture to
which is connected both the pressure gauge and the gas pressure
reservoir through the valve. This effectively prevents electric
discharges from passing either to the pressure gauge or the
valve which would otherwise destroy the pressure gauge.

Official Gazette of the U S Patent and Trademark Office
A pulse forming network for compressing the width and sharpening the rise time of high voltage pulses from relatively slow rise time generators is discussed. The network also provides impedance matching from a high impedance source to a low impedance load for the purpose of efficient energy transfer. Cascaded saturable inductor switches are provided for pulse width compression so that output pulses having rise times of less than one hundred nanoseconds can be obtained. The pulse rise times were determined by the thickness of a high permeability material forming the saturable inductor switch. A means for magnetically biasing the saturable inductor switch so that only pulses from a pulse generator having one polarity are passed and pulses having the opposite polarity are blocked is presented. NASA

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

N79-10421* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala

COMPUTERIZED SYSTEM FOR TRANSLATING A TORCH HEAD Patent

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

Official Gazette of the U.S. Patent Office

N79-10426 National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

FREE-PISTON REGENERATIVE HOT GAS HYDRAULIC ENGINE Patent Application
Donald G. Beremand, inventor (to NASA) Filed 12 Oct. 1978
21 p.

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

N79-10427 National Aeronautics and Space Administration Pasadena Office, Calif.

A QUARTZ BALL VALVE Patent Application

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

N79-11402 National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston Tex.

POSITIVE ISOLATION DISCONNECT Patent

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

N79-11403 National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio

FUEL DELIVERY SYSTEM INCLUDING HEAT EXCHANGER MEANS Patent

A fuel delivery system is presented wherein first and second heat exchanger means are each adapted to provide the transfer of heat between the fuel and a second fluid such as lubricating oil associated with the gas turbine engine. Valve means are included which are operative in a first mode to provide for flow of the second fluid through both first and second heat exchange...
means and further operative in a second mode for bypassing the second fluid around the second heat exchanger means.

Official Gazette of the U.S. Patent Office

**N79-11404**

National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala

SPHERICAL BEARING Patent

William N. Myers and Leopold A. Hein inventors (to NASA)
Issued 8 Aug 1978 8 p Filed 29 Oct 1976 Supersedes N77-11403 (15-02 p 0200)

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

Official Gazette of the U.S. Patent Office

**N79-11405**

National Aeronautics and Space Administration
Pasadena Office, Calif

PLASMA IGNITER FOR INTERNAL COMBUSTION ENGINE Patent

Dennis J. Fitzgerald and Robert R. Breshears inventors (to NASA)
Issued 31 Oct 1978 7 p Filed 1 Apr 1976 Supersedes N78-13440 (16-04 p 0482) Sponsored by NASA

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

Official Gazette of the U.S. Patent Office

**N79-12445**

National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

SELF-STABILIZING RADIAL FACE SEAL Patent Application

I. Etzion inventor (to NASA) (Technion Research and Development Foundation, Haifa, Israel) Filed 17 Nov 1978 15 p Sponsored by NASA
(NASA-Case-LEW-12991-1 US-Patent-Appl-SN-961832) Avail NTIS HC A02/MA 01 CSCL 11A

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

NASA
AN IMPROVED SUSPENSION SYSTEM FOR A WHEEL ROLLING ON A FLAT TRACK Patent Application
Houston D McGinness inventor (to NASA) (JPL) Filed 17 Nov 1978 25 p
(Contract NAS7-100)

A suspension system is described which has particular utility as an azimuth bearing for large track-mounted antennas. The system comprises a wheel frame assembly including at least one uncrowned wheel connected in supporting relation with the assembly and adapted to be seated in rolling engagement with a flat track a load supporting bed, and a number of flexural struts interconnecting the bed and the assembly. Each of the struts is disposed in an inclined plane passing through the center of the uncrowned wheel surface along the line substantially bisecting the line of contact established between the wheel surface and the track surface and is characterized by a modulus of elasticity sufficient for maintaining the axis of rotation for the wheel in substantial parallelism with the line of contact.

TOTALLY CONFINED EXPLOSIVE WELDING Patent

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

LOCKING REDUNDANT LINK Patent
Frank Henry Bonisch inventor (to NASA) (Sikorsky Aircraft, Stratford Conn.) Issued 5 Sep 1978 6 p Filed 7 Mar 1977 Supersedes N77-18134 (15 - 09 p 1130) Sponsored by NASA

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

HIGH-TORQUE OPEN-END WRENCH Patent
Anthony Giandomenico (JPL) James M Dame (JPL), and Harold Behimer inventors (to NASA) (JPL) Issued 19 Dec 1978 5 p Filed 29 Aug 1977 Supersedes N78-22375 (16 - 13, p 1705) Sponsored by NASA

A wrench is described that is usable where limited access normally requires an open-end wrench but which has substantially the high-torque capacity and small radial clearance characteristics of a closed-end wrench. The wrench includes a sleeve forming a nut-engageable socket with a gap in its side, and an adaptor forming a socket with a gap in its side the adaptor closely surrounding the sleeve and extending across the gap in the sleeve. The sleeve and adaptor have surfaces that become fully engaged when a wrench handle is applied to the adaptor to turn it so as to tighten a nut engaged by the sleeve. Official Gazette of the U S Patent and Trademark Office.
FLUIDIZED BED COAL COMBUSTION REACTOR Patent Application
Philip I Moynihan (JPL) and Donald L Young, inventors (to NASA) (JPL) Filed 15 Dec 1978 13 p (Contract NAS7-100) (NASA-Case-NPO-14273-1, US-Patent-Appl-SN-969759) Avail NTIS HC A02/MF A01 CSCL 13H
A fluidized bed coal reactor which includes a combination nozzle-injector ash-removal unit formed by a grid of closely spaced open channels, each containing a worm screw conveyor, which function as continuous ash removal troughs is presented. A pressurized air-coal mixture is introduced below the unit and is injected through the elongated nozzles formed by the spaces between the channels. The ash build-up in the troughs protects the worm screw conveyors as does the cooling action of the injected mixture. The ash layer and the pressure from the injectors support a fluidized flame holder combustion zone above the grid which heats water in boiler tubes disposed within and/or above the combustion zone and/or within the walls of the reactor.

A PHASE-ANGLE CONTROLLER FOR STIRLING ENGINES Patent Application
Actuators used to control the phase relation between the expander and displacer portions of Stirling engines are proposed. The actuators employ variations in torque requirements of a Stirling engine occurring during each cycle and function as a hydraulic ratchet, whereby minimal external forces are required for varying the phase-angle relations between the crankshafts for expander and displacer portions of the engine.

A METHOD OF MAKING HIGH TEMPERATURE SEALS Patent Application
David S Wang (Rockwell Intern Downey Calif) and Aubrey D Warren, inventors (to NASA) (Rockwell Intern Downey, Calif) Filed 15 Dec 1978 10 p (Contract NAS9-14000) (NASA-Case-MSC-16973-1 US-Patent-Appl-SN-696756) Avail NTIS HC A02/MF A01 CSCL 11A
Roughly dimensioned batts of the fragile high temperature insulation material, as saffil, high temperature insulation aluminas are wrapped in a plastic polyethylene film to form a sausage casing. Circumferential closure is effected by heat sealing of the film longitudinally as close as reasonably possible to the batting to provide a snug fit of the plastic skin formed over the batting. Drawing through a resilient wire mesh sleeve (spring) of such material as Inconel 750 is then readily accomplished through use of a draw cord attached to an overlapping end portion of the plastic skin. The plastic skin absorbs the tensile forces produced in the drawing. Subsequent heating to destructively evolve the plastic film leave the insulation fibers unaffected except released for radial expansion in the spring sleeve. The resulting assembly is cross-sectionally deformable and, therefore useful as a door or hatch seal. The method is seen to be also applicable to the drawing of insulation into other restricted spaces, especially if they are of relatively uniform cross-section.
The seal of the present invention is one which performs the dual function of providing a pressure seal and a thermal barrier in a variable space for the extreme pressure and heat conditions encountered for example, in space flight. The seal features the ability to roll, compress and expand to maintain a pressure-tight thermal seal for preventing entry of hot gases into spaces between adjacent members of the spacecraft.

A device is presented for attachment to the arm of a remote manipulator system carried by a first space vehicle for grasping, aligning and firmly coupling with a payload in the form of a satellite or other object which is in substantial misalignment and/or rotating with respect to the coupling device. The coupling device is characterized by its simplicity, light-weight, small size, low cost and most importantly its reliability. Although the device was designed primarily for use in coupling space vehicles, smaller versions of the device can conceivably be used on the end of any remote type manipulator arm such as for example those used in handling radioactive materials or in underwater exploration.

A gas path seal suitable for use with a turbine engine or compressor is provided. A shroud wearable or abradable by the abrasion of the rotor blades of the turbine or compressor protects the rotor blades. A compliant backing surrounds the shroud. The backing may be made of corrugated sheets or the like with adjacent layers having offset corrugations, with axes of the folds parallel to the rotor axis. The sheets may be bonded together at points of contact by brazing, welding or the like. In another embodiment a compliant material is covered with a thin ductile layer. A mounting fixture surrounds the backing.

A planetary (epicyclic) gear set is provided with a reversible rotating input shaft and individual output shafts actuated respectively by the ring gear and planet gear carrier. Latch means is positioned to selectively and automatically stop the ring gear or carrier member while releasing the other to provide the desired sequential output operation. The output shafts are reversed in sequence and direction of rotation by reversing rotational direction of the input shaft.
**37 MECHANICAL ENGINEERING**

**N79-21346** National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex

**WATER SEPARATOR Patent**


An apparatus for separating liquids from gases or gaseous fluids is described. Features of the apparatus include: (1) the collection and removal of the moisture in the fluid is not dependent upon or affected by gravity, (2) all the collected water is cyclically drained from the apparatus irrespective of the attitude of the separator and (3) a fluid actuator is utilized to remove the collected water from the separator.

**J M S**

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**38 QUALITY ASSURANCE AND RELIABILITY**

Includes product sampling procedures and techniques and quality control.

**N79-14388** National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex

**LENGTH MODE PIEZOELECTRIC ULTRASONIC TRANSDUCER FOR INSPECTION OF SOLID OBJECTS Patent**


The transducer is constructed from individual transducer elements arranged in an array and configured to exhibit a predominant, longitudinal mode transversely to the array. The elements are interconnected through thin flexible sheets. Each element is individually damped, and the transducer as a whole is electrically damped through resonance with the clamped capacitance and dissipation. Electrical control permits inphase operation of all transducer elements or control with preslected phase differences.

Official Gazette of the U S Patent and Trademark Office.
44 ENERGY PRODUCTION AND CONVERSION

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

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

N79-10613* National Aeronautics and Space Administration Pasadena Office Calif
DUAL MEMBRANE HOLLOW FIBER FUEL CELL AND METHOD OF OPERATING SAME Patent

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

Official Gazette of the U.S. Patent Office

N79-11467* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio
SOLAR CELLS HAVING INTEGRAL COLLECTOR GRIDS Patent

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

Official Gazette of the U.S. Patent Office

N79-11468* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio
APPLICATION OF SEMICONDUCTOR DIFFUSANTS TO SOLAR CELLS BY SCREEN PRINTING Patent
44 ENERGY PRODUCTION AND CONVERSION

(NASA-Case-LEW-12775-1 US-Patent-4 104-091

Diffusants were applied onto semiconductor solar cell substrates using screen printing techniques. The method was applicable to square and rectangular cells and can be used to apply dopants of opposite types to the front and back of the substrate. Then simultaneous diffusion of both dopants can be performed with a single furnace pass.

Official Gazette of the U.S. Patent Office

N79-11469* National Aeronautics and Space Administration Marshall Space Flight Center Huntsville Ala
METHOD FOR MAKING AN ALUMINUM OR COPPER SUBSTRATE PANEL FOR SELECTIVE ABSORPTION OF SOLAR ENERGY Patent
Marion L Roberts Max H Sharpe and Albert C Krupnick inventors (to NASA) Issued 1 Aug 1978 7 p Filed 31 Aug 1977 Supersedes N77-11500 (16 - 02 p 2960)

A panel is described for selectively absorbing solar energy comprising an aluminum substrate. A zinc layer was covered by a layer of nickel and an outer layer of solar energy absorbing nickel oxide or a copper substrate with a nickel layer. A layer of solar energy absorbing nickel oxide distal from the copper substrate was included. A method for making these panels is disclosed.

Official Gazette of the U.S. Patent Office

N79-11470* National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio
SOLAR PHOTOYSIS OF WATER Patent
Porter R Ryason inventor (to NASA) Issued 8 Aug 1978 7 p Filed 30 Sep 1977 Supersedes N78-11500 (16 - 02 p 0212) Sponsored by NASA

A cyclic process is described for the solar photolysis of water including a first stage in which water is reduced in the presence of a Eu(III) photooxidizable reagent producing hydrogen and spent oxidized Eu(II) reagent. The spent reagent Eu(II) is reduced by means of a transition metal ligand complex reductant. The spent reagent Eu(II) and spent oxidized Eu(III) reagents are separated from the regeneration in space and time by supporting them such that they are in contact with the conductive layer of the photovoltaic substrate. Heating the substrate while simultaneously oxidizing the portions of the conductive layer exposed to a gaseous oxidizing substance forced into the recessed regions of the heat sink creates a transparent metal oxide layer on the substrate.

A continuous pattern of highly conductive metal channels is contained in the metal oxide layer.

Official Gazette of the U.S. Patent Office

N79-11471* National Aeronautics and Space Administration Pasadana Office Calif
NON-TRACKING SOLAR ENERGY COLLECTOR SYSTEM Patent

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

Official Gazette of the U.S. Patent Office

N79-11472* National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio
SOLAR CELL COLLECTOR AND METHOD FOR PRODUCING SAME Patent

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

A continuous pattern of highly conductive metal channels is contained in the metal oxide layer.

Official Gazette of the U.S. Patent Office

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N79-12541* National Aeronautics and Space Administration Pasadena Office Calif

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


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

N79-14527* National Aeronautics and Space Administration Washington D C

SAFETY FLYWHEEL Patent


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

N79-14528* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

BACK WALL SOLAR CELL Patent


A parabolic reflector is supported so that it can track the sun. The support for this reflector comprises an azimuth frame supported on two wheels and a central pivot point which are positioned in a substantially triangular configuration. On top of the azimuth frame, there is provided an elevation frame. The reflector rides on wheels captured within curved rails. The wheels of the azimuth frame are driven by an azimuth actuator. The reflector structure is counterbalanced about its elevation axis by a pendulum cable system which is driven by a motor. At the focal point of the parabolic reflector a heat engine or receiver is mounted independently on the reflector. Suitable means are provided for moving the reflector about its two axes.
A solar cell is disclosed which comprises a first semiconductor material of one conductivity type with one face having the same conductivity type but more heavily doped to form a field region arranged to receive the radiant energy to be converted to electrical energy, and a layer of a second semiconductor material preferably highly doped of opposite conductivity type on the first semiconductor material adjacent the first semiconductor material at an interface remote from the heavily doped field region. Instead of the opposite conductivity layer, a metallic Schottky diode layer may be used in which case no additional back contact is needed. A contact such as a gridded contact previous to the radiant energy may be applied to the heavily doped region of the more heavily doped, same conductivity material for its contact.


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

N79-14528* National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio

CATALYST SURFACES FOR THE CHROMOUS/CHROMIC REDOX COUPLE Patent Application


An electricity-producing cell of the reduction-oxidation (REDOX) type is presented. The cell comprises a container divided into anode and cathode compartments by an ion permeable membrane. The novelty of the invention appears to lie in the provision of selected catalytic coatings with lead on the anode electrode of a REDOX cell to greatly increase current density.
**N79-17314**

**SOLAR ARRAY STRIP AND A METHOD FOR FORMING THE SAME Patent**


A flexible solar array strip is formed by providing printed circuitry between flexible layers of a nonconductive material, depositing solder pads on the printed circuitry and storing the resulting substrate on a drum from which it is then withdrawn and advanced along a linear path. Solderless solar cells are serially transported into engagement with the pads and are infrared radiation to melt the solder and attach the cells to the circuitry. Excess flux is cleaned from the solar cells which are then encapsulated in a protective coating. The resulting array is then wound on a drum.

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

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**N79-18444**

**METHOD FOR FABRICATING SOLAR CELLS HAVING INTEGRATED COLLECTOR GRITS Patent**


The photovoltaic devices of the invention are heterojunction or Schottky barrier devices which possess an integral mixed metal oxide coating which in which is embedded a metal network which functions as an efficient collector of electrons set in motion by the photovoltaic process. The metal grid system is formed from the metal elements of the transparent conductive mixed metal oxide coating which is in contact with the oxide coating which constitutes the barrier of the devices with the semiconductor substrate.

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

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**N79-18445**

**METHOD OF MITIGATING TITANIUM IMPURITY EFFECTS IN P-TYPE SILICON MATERIAL FOR SOLAR CELLS Patent Application**

Amal M. Salama, inventor (to NASA) (JPL) Filed 31 Jan 1979 17 p (Contract NAS7-100) (NASA-Case-NPO-14635-1 US-Patent-Appl-SN-008212) Avail NTIS HC A02/MF A01 CSCL 10A

A technique is presented for reducing the deleterious effect of titanium impurities (commonly found in metallurgical grade silicon) on silicon solar cells. The novelty of the invention resides in the technique of adding copper to silicon melt for the Czochralski crystal growth process when titanium impurities are present. The copper added is of at least the same concentration as the titanium impurities present, but not greater than 10 to the 16th power atoms/cm. This mitigates the deleterious effects of the titanium impurities when the silicon crystal growth is used for solar cells.

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

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

A method for feeding a flexible strip having deposited thereon etched electrical circuitry is presented. The apparatus includes a supply drum for feeding a flexible strip having deposited thereon etched electrical circuitry.
detector element, and an image rotating means which is turned as one of the objects rotates is also included to derotate the images of the emitter elements that are to be focused on the detector elements.

**N79-20613**

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

M. Kudret Selcuk inventor (to NASA) JPL Filed 6 Apr 1979 12 p

(Contract NAS7-100)

NASA A02/MF A01 CSCL 10A

Damage to a Stirling engine is prevented by using a solar receiver of separable configuration to reduce solar flux density in order to protect the heat exchanger contained within the receiver. A solar energy receiver includes a separable endless wall formed of a ceramic material in which a cavity of a substantially cylindrical configuration is defined for entrapping solar flux. An acceptance aperture admits a concentrated beam of solar energy to the cavity. The wall is characterized by at least one pair of contiguously related segments separated by lines of cleavage intercepting the aperture. At least one of the segments is supported for pivotal displacement. A thermoresponsive actuator is adapted to respond to excessive temperatures within the cavity for initiating pivotal displacement of such segment so that thermal flux is permitted to escape from the cavity.

**N79-21639**

**SOLAR CELL MODULE ASSEMBLY JIG Patent**

Herbert W. Farrell inventor (to NASA) TRW, Inc Redondo Beach, Calif. Issued 26 Jul 1966 7 p

Sponsored by NASA

NASA A01/MF A02 CSCL 10A

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

**N79-10570**

**SMOKESTACK-MOUNTED AIRFOIL Patent**

Robert C. Costen inventor (to NASA) Issued 11 Jan 1978 12 p

Supersedes N76-13419 (14.04 p 0449)

NASA A02/MF A01 CSCL 10A

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

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

Official Gazette of the U.S. Patent Office

46 GEOPHYSICS

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

For space radiation see 93 Space Radiation

N79-19521* National Aeronautics and Space Administration Pasadena Office, Calif.
BOREHOLE GEOLOGICAL ASSESSMENT Patent Application
William Spuck III inventor (to NASA), (JPL) Filed 4 May 1978
19 p. Sponsored by NASA
(NASA-Case-NPO-14231-1. US-Patent-Appl-SN-903019) Avail NTIS HC A02/MA A01 CSCL 08G

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

Official Gazette of the U.S. Patent and Trademark Office
(pixels) between the boreholes. Such information is useable to produce a tomograph of the subsoil structure between the boreholes.

51 LIFE SCIENCES (GENERAL)

48 OCEANOGRAPHY
Includes biology, dynamic, and physical oceanography and marine resources.

N79-10689* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala.

OCEANIC WAVE MEASUREMENT SYSTEM Patent Application


A system which utilizes a barometer to measure oceanic waves is presented. The basic novelty of the invention lies in combining the technique of obtaining a height signal by barometric measurement and effecting crest-to-trough measurements each half cycle of wave motion whereby a complete history of crest-to-trough and trough-to-crest measurements is recorded. The invention conveniently provides for the additional measurements of average wave frequency and significant wave height.

N79-20654* National Aeronautics and Space Administration Pasadena, Calif.

A SYSTEM FOR DETECTING SUBSTRUCTURE MICRO-FRACTURES AND METHOD THEREFOR Patent Application


A system to determine substructure permeability is described. Bursts of signals at different frequencies are induced into substructure, adjacent a borehole. The return signals from each burst of signals are normalized to compensate for the attenuation experienced by more distant return signals. The peak amplitudes of return signals above a selected level, are cut off, and an average signal is produced from the normalized amplitude-limited return signals of each burst. The averaged signals of the return signals of all the signal bursts at the different frequencies are processed, to provide a combined signal whose amplitude is related to the microfracture density of the substructure adjacent to the borehole.

N79-10693* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala.

WATER SYSTEM VIRUS DETECTION Patent


The performance of a waste water reclamation system is monitored by introducing a non-pathogenic marker virus bacteriophage F2 into the waste-water prior to treatment and thereafter testing the reclaimed water for the presence of the marker virus. A test sample is first concentrated by absorbing any marker virus onto a cellulose acetate filter in the presence of a trivalent cation at low pH and then flushing the filter with a limited quantity of a glycine buffer solution to desorb any.
needed at any time during the freezing process. The temperature of the bag and hence of the tissue is compared with a time programmed desired value for the tissue temperature to derive an error indication. The heater is activated in response to the error indication so that the temperature of the tissue follows the desired value for the time programmed tissue temperature. The tissue is heated to compensate for excessive cooling of the tissue as a result of the cooling by the refrigerating gas. In response to the error signal, the heater is deactivated while the latent heat of fusion is being removed from the tissue while the tissue is changing phase from liquid to solid.

**N79-10694** National Aeronautics and Space Administration
Goddard Space Flight Center Greenbelt Md
SYSTEM FOR AND METHOD OF FREEZING BIOLOGICAL TISSUE Patent
(NASA-Case-GSC-12173-1 US-Patent-4 117 881

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

**N79-21743** National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
A METHOD FOR SEPARATING BIOLOGICAL CELLS Patent Application
D. E. Brooks, inventor (to NASA) 6 Mar 1979 11 p
(NASA-Case-MFS-23883-4 US-Patent-Appl-SN-017888) Avail NTIS HC A02/MF A01 CSCL 06C

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

**N79-10724** National Aeronautics and Space Administration
Ames Research Center Moffett Field Calif
CONTOUR DETECTOR AND DATA ACQUISITION SYSTEM FOR THE LEFT VENTRICULAR OUTLINE Patent
(NASA-Case-ARC-10985-1 US-Patent-4 101 961

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

Official Gazette of the U.S. Patent Office

N79-11684 # National Aeronautics and Space Administration Ames Research Center Moffett Field Calif
SUBCUTANEOUS CHANNELING PROBE Patent Application
Gordon F. Lund (NAC-NRC) Richard C. Simmonds and Bill A. Williams inventors (to NASA) Filed 31 Oct 1978 12 p
(NASA-Case-ARC-11091-1 US-Patent-App-N-956162) Avail NTIS HC A02/MF A01 CSCL 06B

The subcutaneous channeling probe 15 provided an instrument for use in the placement of biosensors with long leads in animals. The probe channeled subcutaneously through connective tissue from the site of lead entry 4 to the site of biosensor placement. After securing a sensor to the end of the probe, the probe was pulled out of an exit incision 5, guiding the biosensor and lead into place. The probe was constructed of flexible rod material such as standard 9.5 mm (3/8 inch) nylon rod and was provided with blunted pointed tips, spearhead tip 8, and tapered end tip 9. This design permitted the efficient channeling of the instrument through connective tissue when force was exerted through the rod. However, because of the blunted edges, the actual cutting of the connective tissue was kept to a minimum. Further, the probe was constructed in sections 16, 17, and 18.

NASA

N79-11684 # National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

N79-12694 # National Aeronautics and Space Administration Pasadena Office Calif
AUTOMATED CLINICAL SYSTEM FOR CHROMOSOME ANALYSIS Patent

52 AEROSPACE MEDICINE

An automatic chromosome analysis system is provided wherein a suitably prepared slide with chromosome spreads thereon is placed on the stage of an automated microscope. The automated microscope stage is computer operated to move the slide to enable detection of chromosome spreads on the slide. The X and Y location of each chromosome spread that is detected is stored. The computer measures the chromosomes in a spread and classifies them by group or by type and also prepares a digital karyotype image. The computer system can also prepare a patient report summarizing the result of the analysis and listing suspected abnormalities.

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

N79-14748 # National Aeronautics and Space Administration Pasadena Office, Calif
GAS DIFFUSION LIQUID STORAGE BAG AND METHOD OF USE FOR STORING BLOOD Patent

The shelf life of stored whole blood may be doubled by adding a buffer which maintains a desired pH level. However, this buffer causes the generation of CO2 which, if not removed at a controlled rate, causes the pH value of the blood to decrease, which shortens the useful life of the blood. A blood storage bag is described which permits the CO2 to be diffused out at a controlled rate into the atmosphere thereby maintaining the desired pH value and providing a bag strong enough to permit handling.

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

59
A method is described for the quick determination of the susceptibilities of various unidentified bacteria contained in an aqueous physiological fluid sample, particularly urine to one or more antibiotics. A bacterial adenosine triphosphate (ATP) assay is carried out after the elimination of non-bacterial ATP to determine whether an infection exists. If an infection does exist, a portion of the sample is further processed including subjecting parts of the portion to one or more antibiotics. Growth of the bacteria in the parts are determined, again by an ATP assay, to determine whether the unidentified bacteria in the sample are susceptible to the antibiotics under test.

Mean Ulcer Score

Mean Percent Inhibition

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

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

A miniature echosonometer adapted for implantation in the interior of an animal for imaging the internal structure of an organ tissue or vessel is presented. The echosonometer includes a receiver/transmitter circuit which is coupled to an ultrasonic transducer. Power is coupled to the echosonometer by electromagnetic induction through the animal’s skin. Imaging signals from the echosonometer are electromagnetically transmitted through the animal’s skin to an external readout apparatus.

A method is described for measuring the dynamic metabolic rate of a human or animal. The ratio of the exhaled carbon dioxide to a known amount of C13O2 introduced into the exhilation is determined by mass spectrometry. This provides an instantaneous measurement of the carbon dioxide generated.
54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

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

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

PROTECTIVE GARMENT VENTILATION SYSTEM Patent

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

TERMINAL GUIDANCE SENSOR SYSTEM Patent Application

A system is described for guiding a claw to the proper distance and into the proper orientation in yaw and pitch, to engage a grappling fixture. The system includes two proximity sensors on the claw, that are arranged at the corners of an imaginary square, which sense the distance to the top surface of the grappling fixture. If a pair of sensors at opposite corners of the square sense a different distance to the top surface of the grappling fixture, then it is known that the claw is rotated about a corresponding axis with respect to the plane of the grappling fixture.
EMERGENCY SPACE-SUIT HELMET Patent
Harvey A Smith inventor (to NASA) (United Aircraft Corp E Hartford, Conn) Issued 2 Jun 1970 4 p Filed 24 Feb 1966 Sponsored by NASA
A collapsible automatically extensible, emergency space helmet is described. The unit when deflated is carried on the back of the wearer, attached to the suit, so as not to interfere with normal activities. When inflated the head of the wearer is completely incapsulated.

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

HIGH-SPEED MULTIPLEXING OF KEYBOARD DATA INPUTS Patent Application
A method and apparatus are provided for a high speed multiplexing system in which keyboard entered data is automatically and automatically sampled by a multiplexer for input to a computer. A sequencer is provided which sequentially and automatically controls the multiplexer so that each keyboard data input is sampled in accordance with a predetermined sampling.

71 ACOUSTICS
Includes sound generation, transmission and attenuation.
For noise pollution see 45 Environment Pollution.

SOUND-SUPPRESSING STRUCTURE WITH THERMAL RELIEF Patent
Dudley O Nash (GE, Cincinnati) and Joseph Holowach, inventors (to NASA) Issued 15 Aug 1978 5 p Filed 2 Jul 1976 Sponsored by NASA
Sound-suppressing structure comprising stacked acoustic panels wherein the inner high frequency panel is mounted for thermal expansion with respect to the outer low frequency panel is discussed. Slip joints eliminate the potential for thermal stresses, and a thermal expansion gap between the panels provides for...
71 ACoustics

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

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

N79-20827* National Aeronautics and Space Administration
Pasadena Office, Calif

ACOUSTIC DRIVING OF ROTOR Patent
Hilda Kanber (JPL), Isadore Rudnick (JPL), and Taylor G Wang
inventors (to NASA) (JPL) Issued 13 Feb 1979 4 p Filed 5
Jul 1977 Successed N78-22859 (16 - 13 p 1773) Sponsored
by NASA
(NASA-Case-NPO-14005-1 US-Patent-4,139806
US Patent and Trademark Office CSCL 20A

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

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

72 ATOMIC AND MOLECULAR
PHYSICS

Includes atomic structure and molecular spectra

N78-13828* National Aeronautics and Space Administration
Pasadena Office, Calif

STABILIZATION OF He2a 3 SIGMA u+ MOLECULES IN
LIQUID HELIUM BY OPTICAL PUMPING FOR VACUUM
UV LASER 6 Patent
Jonas S Zmudzinas, inventor (to NASA) (JPL) Issued 15 Aug
1978 5 p Filed 29 Mar 1977 Successed N77-24468 (15 -
15, p 1994) Sponsored by NASA

74 OPTICS

Includes light phenomena

N79-11866* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville Ala

SYSTEM FOR THE MEASUREMENT OF ULTRA-LOW STRAY
LIGHT LEVELS Patent
Charles L Wyman, Donald B Griner William A Hurd (Sperry
Rand Corp Huntsville Ala), Glenn B Shelton (Sperry Rand
Corporation Huntsville Ala), Gary H Hunt (Sperry Rand
Corporation Huntsville Ala), Bill B Fannin (Ariz Univ
Tucson) Robert P Brealt (Ariz Univ Tucson) and Charles A Hawkins inventors
(to NASA) Issued 25 Jul 1978 9 p Filed 29 Dec 1976
Successed N77-14842 (15 - 05 p 0875)
(NASA-Case-MFS-23513-1 US-Patent-4,102580
CSCL 20F

An apparatus is described for measuring the effectiveness of
stray light suppression light shields and baffle arrangements
used in optical space experiments and large space telescopes
The light shield and baffle arrangement and a telescope model
are contained in a vacuum chamber A source of short
high-powered light energy illuminates portions of the light shield
and baffle arrangement and reflects a portion of same to a
photomultiplier tube by virtue of multipath scattering The resulting
signal is transferred to time-channel electronics timed by the
firing of the high energy light source allowing time discrimina-
tion of the signal thereby enabling the light scattered and
suppressed by the model to be distinguished from the walls and holders around the apparatus.

Official Gazette of the U.S. Patent Office

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**N79-11866**

National Aeronautics and Space Administration
Langley Research Center, Hampton, Va.

NONCONTACTING METHOD FOR MEASURING ANGULAR DEFORMATION Patent Application


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

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

NASA

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**N79-12890**

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

ILLUMINATION CONTROL APPARATUS FOR COMPENSATING SOLAR LIGHT Patent


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**N79-13855**

National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala.

SIMULATOR METHOD AND APPARATUS FOR PRACTICING THE MATING OF AN OBSERVER-CONTROLLED OBJECT WITH A TARGET Patent


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

**N79-14891**

**PARTIAL POLARIZER FILTER Patent**


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

**N79-17683**

**DOUBLE-BEAM OPTICAL METHOD AND APPARATUS FOR MEASURING THERMAL DIFFUSIVITY AND OTHER MOLECULAR DYNAMIC PROCESSES IN UTILIZING THE TRANSIENT THERMAL LENS EFFECT Patent Application**

Jovan Moacanin (JPL), Amitava Gupta (JPL), and Su-Don Hong inventors (to NASA) (JPL) Filed 31 Jan 1979 24 p (Contract NAS7-100)


Thermal diffusivity and molecular relaxation processes in a sample material are measured by using a pulsed laser light beam which forms a thermal lens in the sample material, and a relatively low power probe light beam which detects changes in the refractive index of the sample material during formation and dissipation of the thermal lens. By integrating a large number of successive formation and dissipation cycles, a composite curve can be developed and used to accurately determine thermal diffusivity and molecular relaxation characteristics of the sample material. The use of thermooptical techniques provides a means for conducting nondestructive tests using both isotropic and anisotropic materials which can be either transparent or opaque to the light sources being utilized. Thermal diffusivity and molecular relaxation characteristics can be measured using a sample undergoing stress test or a sample which is shock-sensitive.
A system for use in Schlieren photography includes (1) a viewing screen adjacent to a large grating, (2) a small grating disposed in spaced relation with the large grating (3) a transparent retainer for confining a transparent medium between the gratings, and (4) optics for imaging the small grating on the large grating. A light source and optically aligned lens are used to project a beam of light along axes extending through the small grating and strike the large grating subsequent to passing through the medium. A Schlieren image of distortions resulting from distortions of light rays proposed by the medium are formed on the screen. A camera is used to photograph the Schlieren image projected on the large screen.
An apparatus employed in the production of ribbon-shaped crystals is characterized by an R-F coil, a crucible for confining a silicon melt, and a susceptor for supporting the crucible and facilitating an electrical coupling of the coil with the melt. The susceptor comprises a pair of susceptor halves of a thickness less than two skin depths each being the mirror image of the other disposed in mutually opposed electrically insulated relation, while the crucible comprises a quartz body including side plates and end plates supported by the graphite susceptor whereby the R-F coil is electrically coupled with the melt. A higher average temperature is attained for the melt than that attained for the susceptor walls so that thermal gradients are easier to control and the input energy to the system is conserved.

N79-11920* National Aeronautics and Space Administration
Pasadena Office Calif

METHOD OF CONTROLLING DEFECT ORIENTATION IN SILICON CRYSTAL RIBBON GROWTH Patent

NASA
MULTILEVEL METALLIZATION METHOD FOR FABRICATING A METAL OXIDE SEMICONDUCTOR DEVICE

Ben R Hollis, Jr, William R Feltner, David L Bouldin, and Donald E Routh inventors (to NASA) Issued 5 Sep 1978

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

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

George W Lewicki (JPL) and John E Guismger inventors (to NASA) Issued 24 Sep 1974

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

PHOTOMECHANICAL TRANSDUCER Patent Application

Robert F Fedors (JPL) and Mohammad N Sarbolouki, inventors (to NASA) Filed 15 Dec 1978

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

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

Warren O Groves, inventor (to NASA) (Monsanto Co., St Louis, Mo.) Issued 25 Feb 1969

Large area semiconductor crystals selected from group 3-5 compounds and alloys are provided for semiconductor device fabrication by the use of a selective etching operation which completely removes the substrate on which the desired crystal was deposited. The substrate selected from the same group as the single crystal, has a higher solution rate than the epitaxial single crystal which is essentially unaffected by the etching solution.

The preparation of gallium phosphide single crystals using a gallium arsenide substrate and a concentrated nitric acid etching solution is described.
URBAN TECHNOLOGY AND TRANSPORTATION

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

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

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

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

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

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

ANASTIGMATIC THREE-MIRROR TELESCOPE Patent

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

Official Gazette of the U.S. Patent Office

N79-10994 National Aeronautics and Space Administration Hugh L. Dryden Flight Research Center Edwards, Calif.

ANTI-AIRCRAFT SYSTEM AND METHOD EMPLOYING SMALL PROJECTILES Patent Application

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

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Section 1: Abstracts

This bibliography is issued in two sections: Section 1 - Abstracts, and Section 2 - Indexes. This issue of the Abstract Section cites 240 patents and applications for patent introduced into the NASA scientific and technical information system during the period of January 1979 through June 1979. Each entry of the Abstract Section consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or application for patent.

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