Patent Abstracts

These Patent Abstracts of recently issued patents are intended to provide the minimum information necessary for readers to determine if they are interested in examining the patent in more detail. Complete copies of patents are available for a small fee by writing: U.S. Patent and Trademark Office, Box 9, Washington, D.C. 20231.

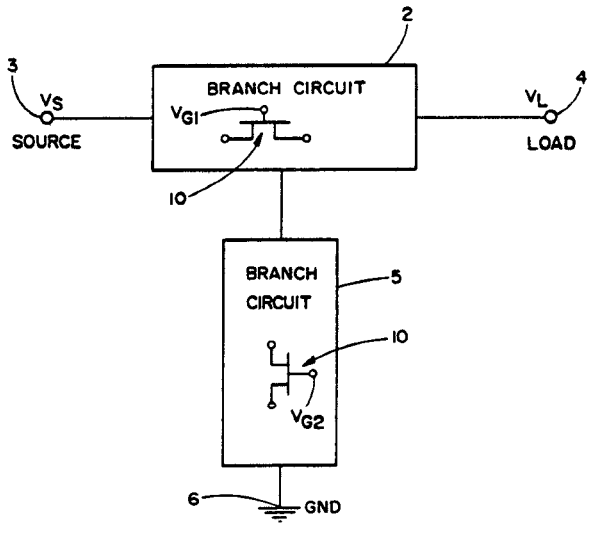
4,875,023 Oct. 17, 1989

Variable Attenuator Having Voltage Variable FET Resistor with Chosen Resistance-Voltage Relationship

Inventor: Barak Maoz.
Assignee: Grumman Aerospace Corporation.
Filed: May 10, 1988.

Abstract—A variable attenuator having first and second branch circuits configured in bridged *T*, *T* or *P I* topologies, each of the branch circuits having at least one voltage variable FET resistor. The voltage variable FET resistor includes a FET network comprising a plurality of FET segments each of which have a predetermined gate width and a voltage divider network including a plurality of fixed resistors coupled to the gates of the plurality of FET segments for providing a different predetermined gate voltage to each of the FET segments. The gate width of each of the FET segments and the resistance of each of the fixed resistors is chosen to provide a predetermined relationship between the control voltage and the channel resistance of the voltage variable FET resistor, to thereby provide a preselected relationship between the control voltage applied to the first branch circuit and the attenuation ratio of the attenuator.

31 Claims, 10 Drawing Sheets



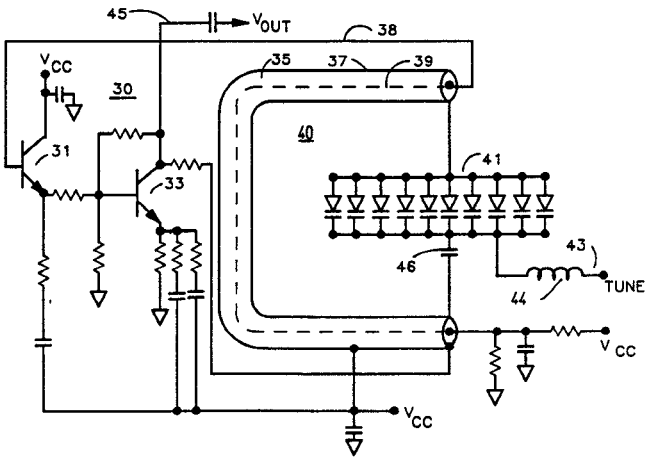
4,939,481 July 3, 1990

Low-Phase Noise Voltage Controlled Oscillator

Inventor: Marcus DaSilva.
Assignee: Hewlett-Packard Company.
Filed: June 29, 1988.

Abstract—A varactor diode tuned voltage controlled oscillator which simultaneously optimizes several techniques to minimize AM to FM conversion in the LC resonant circuit to provide an RF signal having minimum phase noise is described. A high gain current limiting RF amplifier is coupled to a high *Q*, high capacitance, low impedance LC resonant circuit by an impedance transformation network to provide a high tank circulating power having minimum RF voltage fluctuations. The RF voltage across the varactor tuning diodes is further reduced by connecting two varactor diodes in series, back-to-back, or by connecting a fixed capacitance in series with the parallel connected varactor diodes.

9 Claims, 4 Drawing Sheets



4,939,485 July 3, 1990

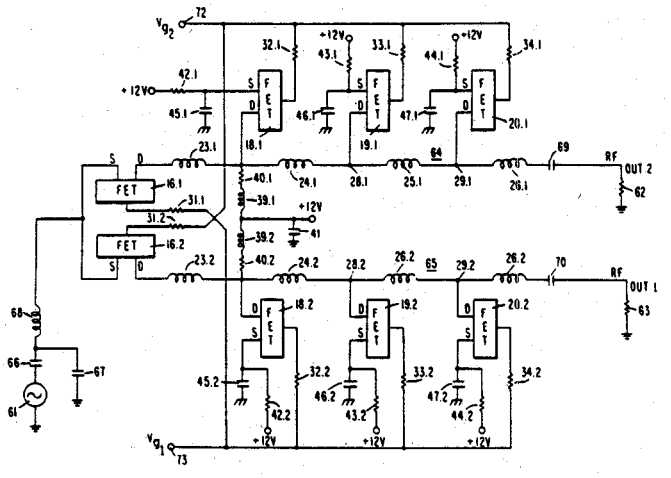
Microwave Field Effect Switch

Inventor: John A. Eisenberg.
Assignee: Varian Associates, Inc.
Filed: Dec. 9, 1988.

Abstract—A monolithic microwave integrated circuit switch includes a series field effect transistor having a source drain path in series with an inductive transmission line including plural taps. Source drain paths of plural shunt field effect transistors are connected to the taps. The source drain paths of the series and shunt transistors are biased so that the series and shunt source drain paths have complementary low and high impedance states. The high impedance state is capacitive, having a value on the order of magnitude of the inductive transmission line. During a first time interval, the capacitive and inductive impedances form a matched low-pass filter to supply current from a microwave source to a load. During a second time interval, current from the microwave source flows through the shunt field effect transistors to be decoupled from the load. The circuit is in stripline form, with source electrodes of field effect transistors including first and second arms respectively having first and second elongated parallel sides. First and second elongated edges of drain electrodes of the transistors extend parallel to the elongated sides. A gate electrode of each transistor includes first and second elongated fingers respectively extending parallel the elongated sides and

edges. The first finger is between the first side and first edge; the second finger is between the second side and second edge.

18 Claims, 8 Drawing Sheets



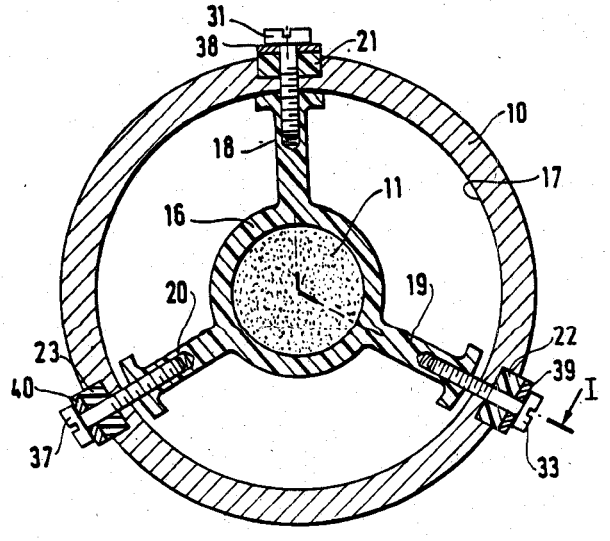
4,939,489 July 3, 1990

Filter Having a Dielectric Resonator

Inventors: Jean-Michel Guèble, Bernard Théron, and Jean-Bernard Ducrocq.
Assignee: Alcatel Espace.
Filed: Feb. 13, 1989.

Abstract—A filter having a dielectric resonator, the filter comprising at least one cylindrical cavity (10) containing a cylindrical dielectric resonator (11) whose axis of symmetry (Δ) is colinear with the axis of said cavity (10), and the resonator being held in a longitudinally asymmetrical position inside said cavity (10) by a mandrel system that clamps around the cylindrical portion thereof and that includes at least one spoke for fixing it to said cavity while leaving play relative to said cavity.

8 Claims, 2 Drawing Sheets



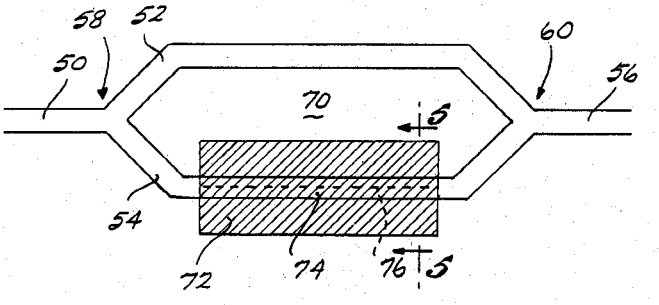
4,940,302 July 10, 1990

Integrated Optics Waveguides with Large Phase Shifts

Inventors: Theodore L. Houk and R. Aaron Falk.
Assignee: The Boeing Company.
Filed: Mar. 13, 1989.

Abstract—A technique for producing an integrated optics waveguide having a large index of refraction difference with respect to an otherwise similar waveguide that does not utilize the invention. A proton exchange region is formed in a lithium niobate substrate, and a titanium waveguide is formed in the substrate within the proton exchange region. The dimensions of the waveguide and proton exchange region are selected such that substantially all of the field of the lowest guided mode of the waveguide is contained within the proton exchange region. By utilizing such a waveguide as one arm of an interferometer formed in the substrate, a large optical path length difference between the interferometer arms may be created.

11 Claims, 3 Drawing Sheets



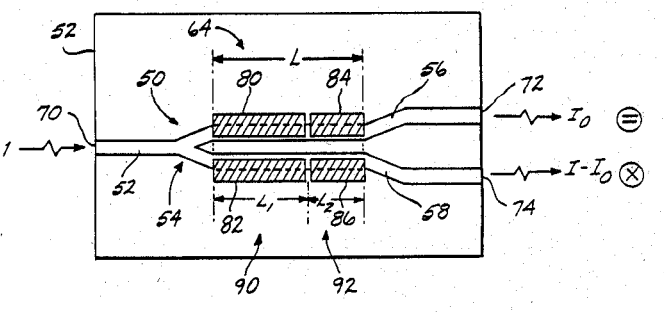
4,940,305 July 10, 1990

Optical Switch Based on 1 × 2 Directional Coupler

Inventor: Suwat Thaniyavarn.
Assignee: The Boeing Company.
Filed: Mar. 22, 1989.

Abstract—An optical switch that does not require precise voltage control to produce the crossover and straight-through states. The switch comprises an electrooptic substrate in which a pattern of optical waveguides is formed, the pattern including an input waveguide that branches to form first and second output waveguides. The output waveguides pass through a coupling region within which evanescent field coupling can occur. A first pair of electrodes produces a first propagation constant difference $\Delta\beta_1$ in a first section of the coupling region, and a second pair of electrodes produces a second difference $\Delta\beta_2$ in a second section of the coupling region. By forming the first and second sections to have different lengths, and by causing $\Delta\beta_1$ and $\Delta\beta_2$ to have opposite polarities, an optical switch is provided having wide voltage tolerances for the crossover and straight-through states.

9 Claims, 3 Drawing Sheets



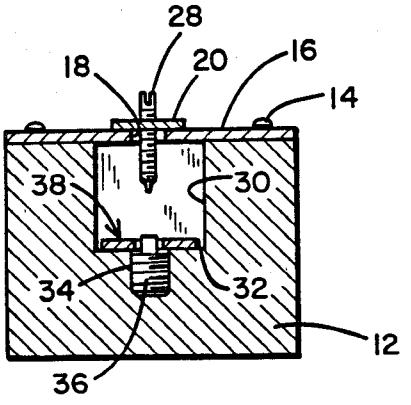
4,940,953 July 10, 1990

Millimeter Wave Microstrip Impatt Diode Oscillator

Inventor: John R. Lamberg.
Assignee: Honeywell Inc.
Filed: Sept. 5, 1989.

Abstract—A millimeter-wave microstrip oscillator utilizing either a pulsed or CW IMPATT diode as the active element provides relatively high power output not available with a GUNN diode. The circuit comprises a block of conductive metal having a channel of rectangular cross-section formed therein and including a cylindrical well formed inwardly in the block from the floor of the channel. A packaged IMPATT diode of either the pulsed or CW variety fits into the well with the cap portion of the package coplanar with the microstrip circuit pattern when the microstrip rests on the floor of the channel. The pattern includes a shunt open circuit stub and an impedance transformer connected to the terminals of the IMPATT diode for effectively matching the diode's complex impedance with the load. A conductive cover is secured to the block and a laterally and vertically movable tuning screw passes through the cover for fine tuning the oscillator's output frequency and power. The circuit is capable of producing CW or pulsed signals with appropriate choice of IMPATT diode bias signal (pulsed or DC), microstrip circuit pattern dimensions and tuning screw diameter and position.

5 Claims, 1 Drawing Sheet



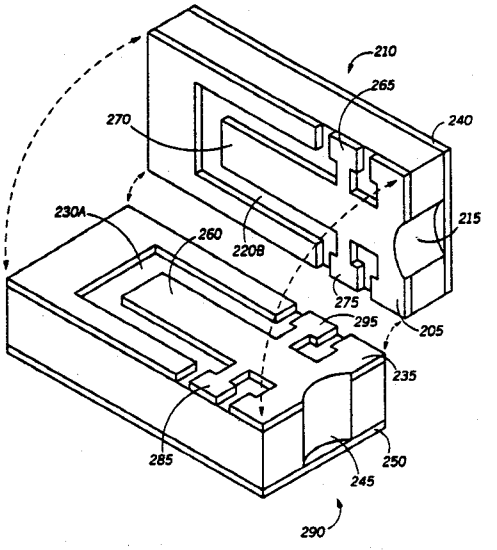
4,940,955 July 10, 1990

Temperature Compensated Stripline Structure

Inventor: Robert J. Higgins, Jr.
Assignee: Motorola, Inc.
Filed: Jan. 3, 1989.

Abstract—A stripline structure has a stabilizied resonant frequency against temperature variations. It includes a lower and an upper substrate of ceramic materials, each substrate having opposing inner and outer surfaces. Each of the outer surfaces are covered with a layer of conductive material constituting ground planes. Resonator strips of conductive material are situated on each of the inner surfaces, and each have one end connected to the ground, while the opposite end is an open circuit. The upper and lower substrates are bonded together along the length of their respective resonator strips, thereby producing the stripline structure. The length of the resonator determines the resonant frequency of the stripline structure. The two substrates are made of materials having opposite dielectric temperature coefficient. The physical parameters of the stripline structure, such as, thicknesses of the substrates, the widths of the resonator strips, or both can be adjusted in order to produce a net zero, positive or negative frequency temperature coefficient. Furthermore the substrates can be made of dielectric or ferrite materials.

21 Claims, 3 Drawing Sheets



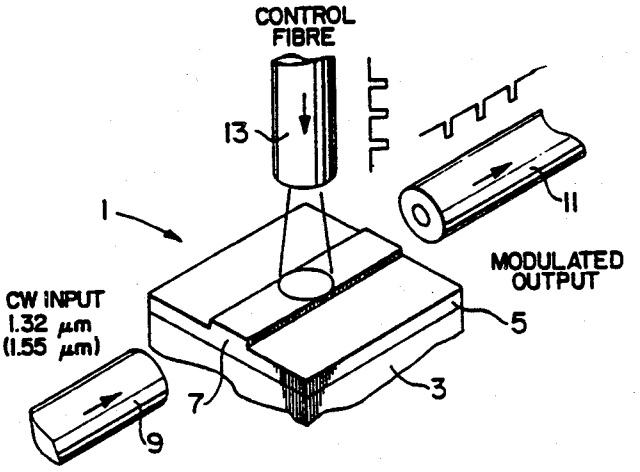
4,941,725 July 17, 1990

All-Optical Planar Modulator Structure with Channel Waveguides

Inventor: Richard J. F. Normandin.
Assignee: Canadian Patents & Development Limited.
Filed: Aug. 25, 1989.

Abstract—All optical modulators are disclosed that include a channel waveguide made of an optically nonlinear material and transmitting an infrared beam. A control light whose wavelength is shorter than the bandgap energy of the channel of the guide is directed to the guide to bring it to cutoff. Near 100% modulation was obtained for a silicon waveguide with less than 150 pJ with a subnanosecond initiation and recovery time in a three port, fiber optics, geometry suitable for use as a logic gate. The operation is largely wavelength independent and stable. Planar multiple optical modulator structures are also disclosed as further embodiments.

9 Claims, 8 Drawing Sheets



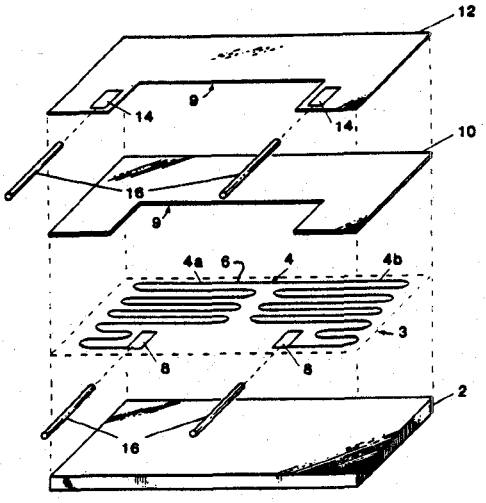
4,942,373 July 17, 1990

Thin Film Delay Lines Having a Serpentine Delay Path

Inventors: Paul Ozawa, Mark Brooks, and Fumitoshi Nakanata.
Assignee: Thin Film Technology Corporation.
Filed: Apr. 11, 1988.

Abstract—Multilayered, thick/thin film, nanosecond delay lines, the inductive/capacitive characteristics of which are tailored to provide line impedances yielding unit delays of 1–10 nanoseconds. The delay lines are constructed on a supporting ceramic, resin/fiber or plastic substrate. In alternative embodiments, a serpentine conductive layer of tailored line widths and conductor spacings is sandwiched relative to overlying dielectric layers of 25 to 200 microns thickness and associated ground plane layers. In another embodiment, multiple conductor layers are sandwiched relative to intervening dielectric and ground plane layers. Lateral contact pads/pins, vertical vias and jumper conductors permit circuit connection and interconnection of the layers.

14 Claims, 6 Drawing Sheets



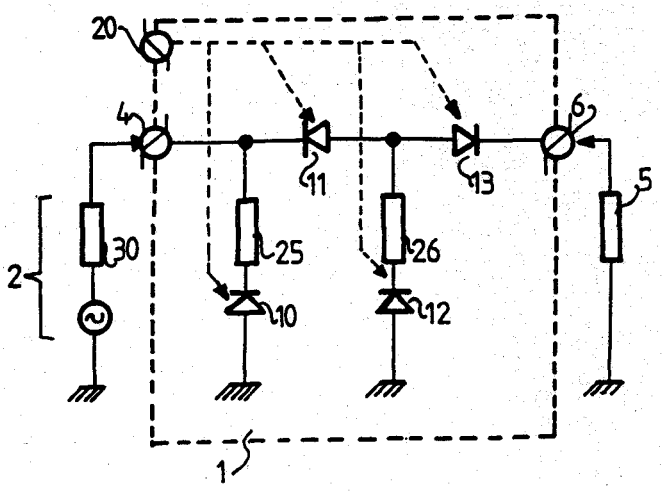
4,942,375 July 17, 1990

Variable Attenuation Device Intended to be Inserted Between a Transmitter Circuit and Load Circuit

Inventors: Gilbert Petitjean, Michel Lebourg, and Christian Le Tortorec.
Assignee: U.S. Philips Corporation.
Filed: Sept. 15, 1989.

Abstract—A variable attenuation device intended to be inserted between a transmitter circuit having a certain internal impedance and a load circuit; it composed of at least on parallel attenuation branch made up from a variable resistance component (in particular a p-i-n diode) and a bias circuit to vary the resistance of the component as a function of an attenuation control variable. The parallel attenuation branch has a limiting component that is connected in series with the variable resistance component and whose value ensures the matching of the internal impedance of the transmitter circuit.

5 Claims, 1 Drawing Sheet



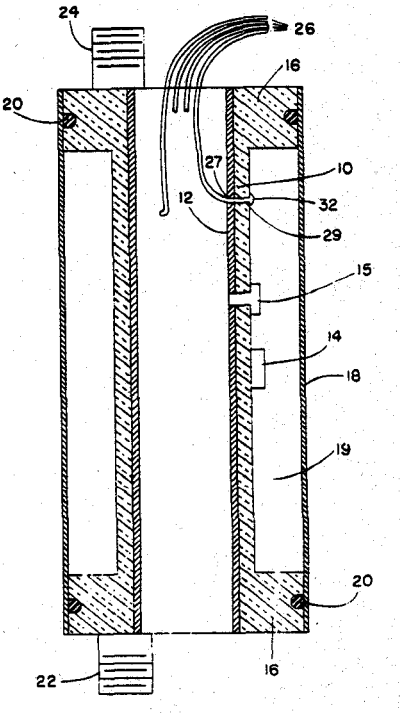
4,942,376 July 17, 1990

Tubular Microwave Phase Shifter

Inventor: William G. Sterns.
Assignee: ITT Corporation.
Filed: Feb. 17, 1989.

Abstract—The present invention constitutes a microwave circuit structure such as a phase shifter that has a dielectric cylindrical support structure with a ground plane on the inside and a microwave circuit mounted on the outside. A cylindrical shield is mounted coaxially around the circuit, spaced therefrom by a second dielectric. Two embodiments are shown in microstrip and stripline.

6 Claims, 2 Drawing Sheets



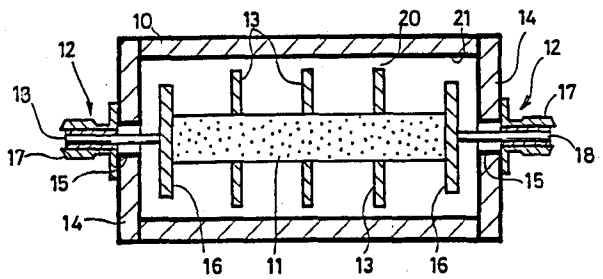
4,942,377 July 17, 1990

Rod Type Dielectric Resonating Device with Coupling Plates

Inventors: Youhei Ishikawa, Kikuo Tsunoda, Toshiro Hiratsuka, and Hirotsugu Abe.
Assignee: Murata Manufacturing Co., Ltd.
Filed: May 23, 1988.

Abstract—A dielectric resonating device comprises a conductive case, a bar-shaped dielectric resonator body located in the case, exciting means for exciting the dielectric resonator body, and at least one plate located between the case and the dielectric resonator body, forming at least two resonators of said device. An inner peripheral end of the plate is fixed to the dielectric resonator body. An outer peripheral end of the plate is located to face the case and define therewith a gap for coupling adjustment between the two resonators. The exciting means has electrodes connected to both ends of the dielectric resonator body, and input and output connectors fixed to the electrodes. The electrodes each have the shape of a flat plate and they are located with a gap between them and the case.

19 Claims, 3 Drawing Sheets



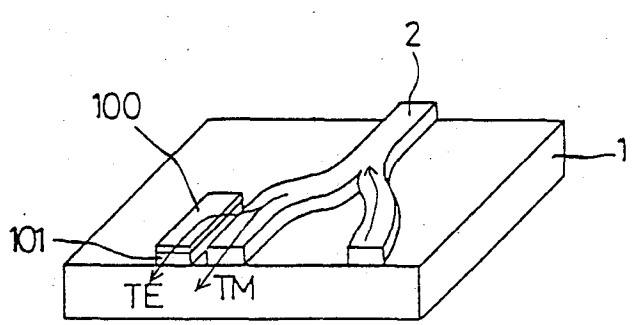
4,943,131 July 24, 1990

Thin-Film Optical Function Element, and Optical Head Using the Same

Inventor: Kazunari Taki.
Assignee: Brother Kogyo Kabushiki Kaisha.
Filed: Oct. 24, 1988.

Abstract—A thin-film optical function element, including a substrate formed of a dielectric material, a first optical waveguide consisting of a thin film of a dielectric material formed on the substrate, and a second optical waveguide consisting of another thin film of another dielectric material formed on the substrate. The first optical waveguide has a substantially same propagation constant with respect to two different modes that have field patterns whose vibrating directions are perpendicular to each other. The second optical waveguide is optically coupled to the first optical waveguide, and is adapted to pass therethrough only one of the two different modes.

6 Claims, 4 Drawing Sheets



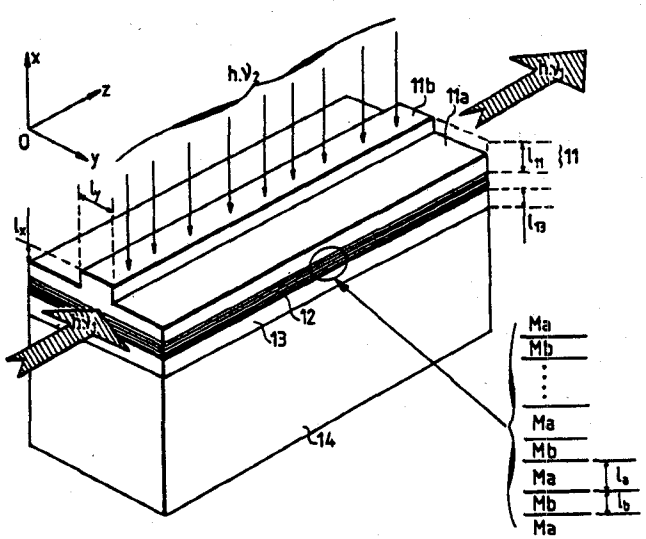
4,943,144 July 24, 1990

Electromagnetic Wave Modulator with Quantum Well Structure and Its Use as a Polarizer

Inventors: Dominique Delacourt, Michel Papuchon, and Jean Paul Pocholle.
Assignee: Thomson-CSF.
Filed: Aug. 30, 1988.

Abstract—A modulator enables the modulation of a wave in the medium infrared range by means of a signal modulating the amplitude of another electromagnetic wave in the near infrared range. The modulator comprises: a central layer such that the electrons of the conduction band have at least two permitted discrete levels of energy, the energy difference of which corresponds to a frequency close to the frequency of the wave to be modulated, and such that the holes of the valence band have permitted levels of energy such that the difference in energy between the permitted fundamental level for the holes in the valence band and the permitted fundamental level for the electrons in the conduction band has a value close to that corresponding to the frequency of the control wave.

5 Claims, 4 Drawing Sheets



4,943,790 July 24, 1990

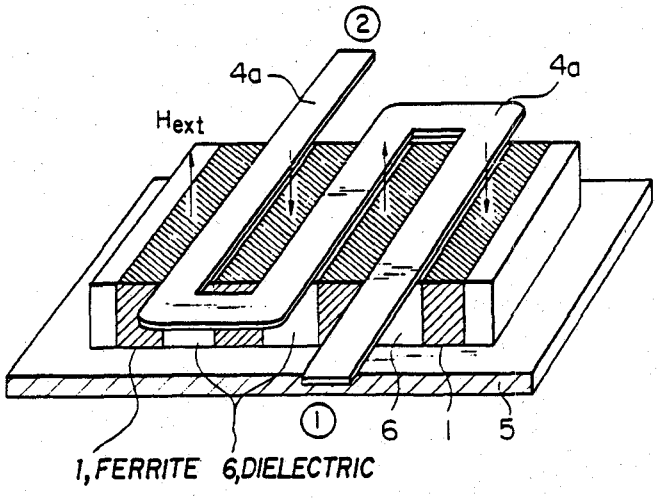
Resonance Absorption-Type Microstrip Line Isolator

Inventors: Shigeru Takeda, and Takashi Tsuboi.
Assignee: Hitachi Metals, Ltd.
Filed: Jan. 19, 1989.

Abstract—A resonance absorption-type microstrip line isolator including a ground conductor; a magnetic member provided on the ground conductor; and a central conductor provided on the magnetic member, portions of the magnetic member on both sides of the central conductor being magnetized oppositely. The magnetic member may be replaced by a composite member constituted by at least two magnetic members and at least one nonmagnetic

dielectric member. Further, to achieve the miniaturization of the isolator, the central conductor may be in a meandering shape.

10 Claims, 4 Drawing Sheets



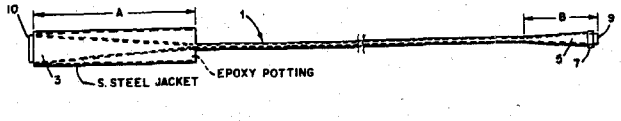
4,944,567 July 31, 1990

Fiber-Optic Laser Beam Delivery System

Inventors: Jerry W. Kuper, Joseph J. Barrett, William E. Langert, Martin C. Baker, and Andrew N. Stephenson.
Assignee: Allied-Signal Inc.
Filed: Jan. 9, 1989.

Abstract—The invention relates to a laser light beam delivery system for delivering a laser light beam from a source remote from the laser originating the light. The delivery system consists of an optical fiber having a double taper, i.e., a taper portion at each end with the fiber tapering at the input end and at the output end to a diameter substantially greater than the actual diameter of the fiber. This permits high power transmission capabilities in as much as the greater diameter portions distribute the average energy such that no damage to the fiber is presented.

12 Claims, 5 Drawing Sheets



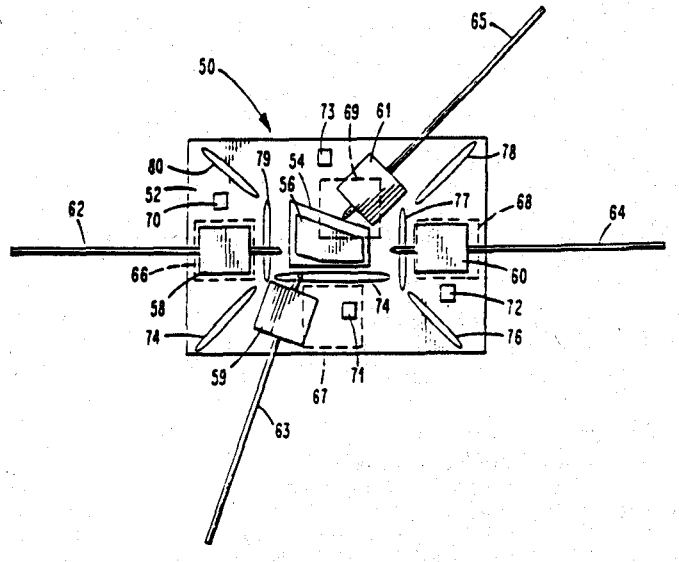
4,944,569 July 31, 1990

Multifiber Alignment Package for Optoelectronic Components

Inventors: Robert A. Boudreau and Joanne S. LaCourse.
Assignee: GTE Laboratories Incorporated.
Filed: Aug. 18, 1989.

Abstract—A localized cooling method allows the sequential alignment and soldering of one optical fiber at a time to a semiconductor package, while previously aligned and soldered optical fibers are held fixed. This method utilizes the mechanical property of a sharp melting point eutectic alloy solder or a pure metal solder for the fiber connections and is effective for multifiber optoelectronic packages demanding stability and high precision. A package design for optoelectronic components requiring multifiber alignment incorporates this feature of localized cooling internally. The localized cooling method and the novel package utilizing this method internally make it possible to eliminate the tilted angle optical fiber alignment problem by mounting tilted facet optical amplifier components at a predetermined offset angle.

17 Claims, 5 Drawing Sheets



4,945,230 July 31, 1990

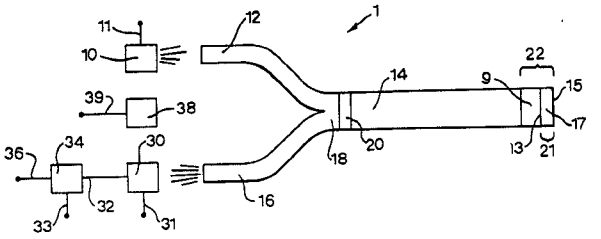
Optical Measuring Device Using a Spectral Modulation Sensor Having an Optically Resonant Structure

Inventors: Elric W. Saaski and James C. Hartl.
Assignee: Metricor, Inc.
Filed: June 4, 1987.

Abstract—Physical changes induced in the spectral modulation sensor's optically resonant structure by the physical parameter being measured cause microshifts of its reflectivity and transmission curves, and of the selected operating segment(s) thereof being used, as a function of the physical parameter being measured. The operating segments have a maximum length and a maximum microshift of less than about one resonance cycle in length for unambiguous output from the sensor. The input measuring light wavelength(s) are selected to fall within the operating segment(s) over the range of values of interest for the physical parameter being measured. The output light from the sensor's optically resonant structure is spectrally modulated by the optically resonant structure as a function of the physical parameter being measured. The spectrally modulated output light is then converted into analog electrical measuring output signals by detection means. In one form, a single optical fiber carries both input light to and output light from the optically resonant structure. When more than one input measuring light wavelength is used, means may also be provided to divide the input light wavelengths into two portions and then take the ratio thereof. This provides several advantages simultaneously, such as enabling longer operating segments and microshifts to be used for greater sensitivity or detection range, and also eliminates certain errors caused by fluctuations in input light

intensity or by changes in light intensity caused by optical fiber bending and optical fiber connectors.

27 Claims, 7 Drawing Sheets



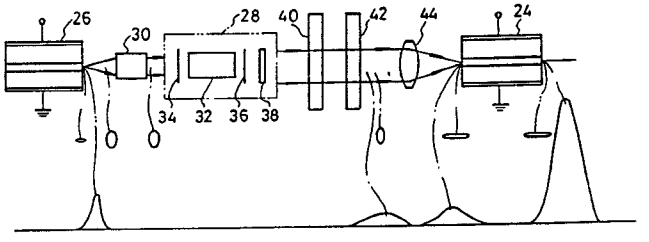
4,945,315 July 31, 1990

Method of and Apparatus for Projecting a Laser Beam into Light Amplifier

Inventor: Hidetoshi Shinada.
Assignee: Fuji Photo Film Co., Ltd.
Filed: Oct. 28, 1988.

Abstract—A method of and an apparatus for projecting an incident laser beam into a broad contact-type light amplifier. The laser beam is projected after the intensity distribution of the laser beam is made to coincide with the electromagnetic field distribution in the fundamental mode of the light amplifier. Since only the fundamental mode is used as the propagation mode of the light amplifier, a Gaussian beam amplified by the light amplifier is emitted. Consequently, the laser beam emitted from the light amplifier can be made into a several-micron spot by condensing the laser beam to a diffraction limit.

7 Claims, 4 Drawing Sheets



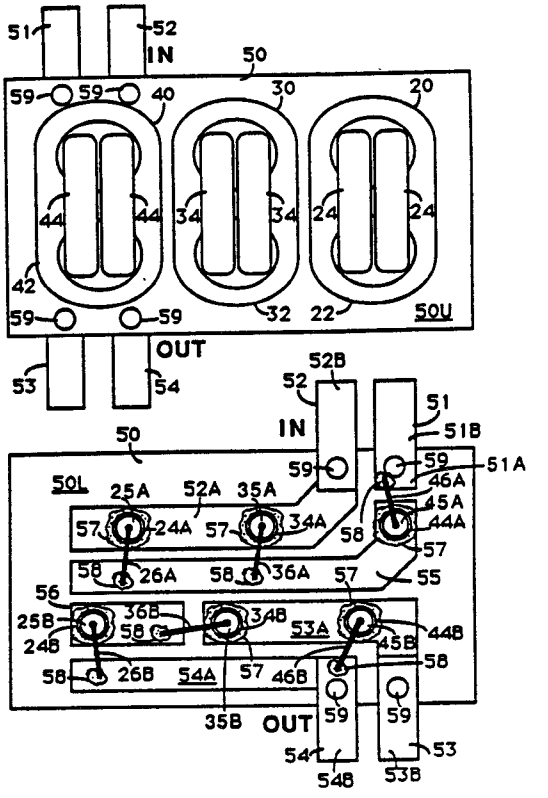
4,945,319 July 31, 1990

High-Frequency Impedance Transformer

Inventor: Lance G. Wilson.
Assignee: Motorola, Inc.
Filed: July 28, 1989.

Abstract—An improved physical implementation of a high-frequency impedance transformer circuit formed from three coaxial transmission line segments is described. In a preferred embodiment, each transmission line segment is in the form of a one and a half turn coil wrapped around a ferrite core. The ends of the coaxial transmission line segments extend through holes in a small PC board and planar conductors thereon. The ends of the transmission line shields are circumferentially soldered to some planar conductors on the board and the center conductors of the coaxial line segments are soldered to adjacent planar conductors on the board in such a way as to provide the desired circuit in a very compact and rugged arrangement.

18 Claims, 2 Drawing Sheets



4,945,320 July 31, 1990

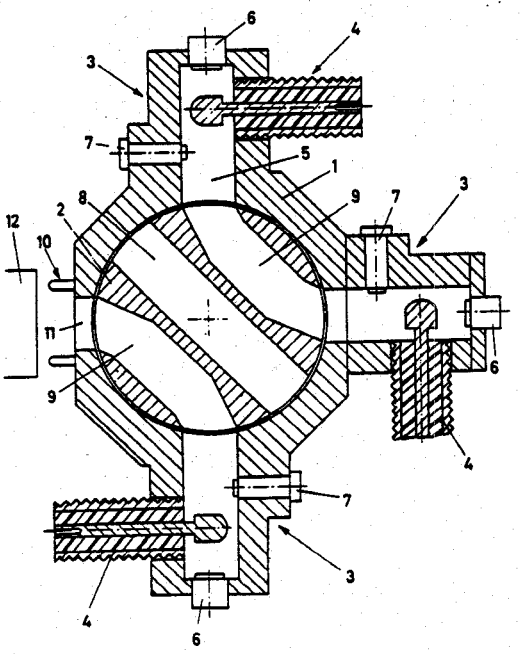
Microwave Switch Having at Least Two Switching Positions

Inventors: Eckart Hettlage and Gerd Ruff.
Assignee: Teldix GmbH.
Filed: Feb. 17, 1987.

Abstract—A waveguide switch selectively connects at least one coaxial input line with at least one of two output lines of which at least one is a coaxial line. The waveguide switch includes a rotor having at least one rectangular waveguide passage that has a height that is relatively small, as well as a housing for rotatably supporting the rotor. The housing has a plurality of waveguide sections, each of the waveguide sections have substantially the same cross-sectional dimensions, and that are connectable with one another by the waveguide passage in the rotor by rotation of the rotor. At least one of the plurality of waveguide sections has an adapter for

connection to at least one of the coaxial input line and at least one of the two *output lines.*

10 Claims, 4 Drawing Sheets



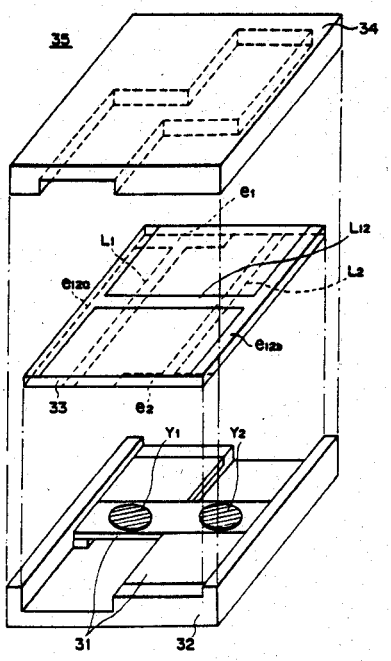
4,945,324 July 31, 1990

Thin-Film Ferromagnetic Resonance Tuned Filter

Inventors: Yoshikazu Murakami, Takahiro Ohgihara, Kanako Niikura, Yasuyuki Mizunuma, and Hiroyuki Nakano.
Assignee: Sony Corporation.
Filed: Mar. 17, 1989.

Abstract—In a thin-film ferromagnetic resonance tuned filter is disclosed that comprises a ferrimagnetic thin films, input and output signal transmission lines respectively coupled with the ferrimagnetic thin films, and a magnetic circuit for applying a dc magnetic field to the ferrimagnetic thin films, the present invention expands the variable frequency band by forming extensions each extending from the signal transmission line so that the distance from the coupling point of the signal transmission line coupled with the corresponding ferrimagnetic thin film to the grounded end thereof is 1/10 or above and less than $\frac{1}{4}$ the wavelength of a wave transmitted in the transmission lines at the upper limit frequency of a tuning frequency band. Further the deterioration of the isolation characteristics is suppressed by bending the extended portions not to form parallel portions to another transmission line.

8 Claims, 14 Drawing Sheets



4,946,235 Aug. 7, 1990

Nonlinear Optical Waveguide Device

Inventors: Michael Scozzafava, Phat T. Dao, Douglas R. Robello, Jay S. Schildkraut, Craig S. Willand, and David J. Williams.
Assignee: Eastman Kodak Company.
Filed: Oct. 11, 1989.

Abstract—An optical article is disclosed containing contiguously overlying an organic layer for the nonlinear propagation of electromagnetic radiation an amorphous transmission enhancement layer of at least 0.5 μm in thickness transmissive to the nonlinearly propagated electromagnetic radiation, exhibiting a refractive index less than that of the organic layer, and comprised of a low molecular weight aromatic compound.

12 Claims, 2 Drawing Sheets