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.

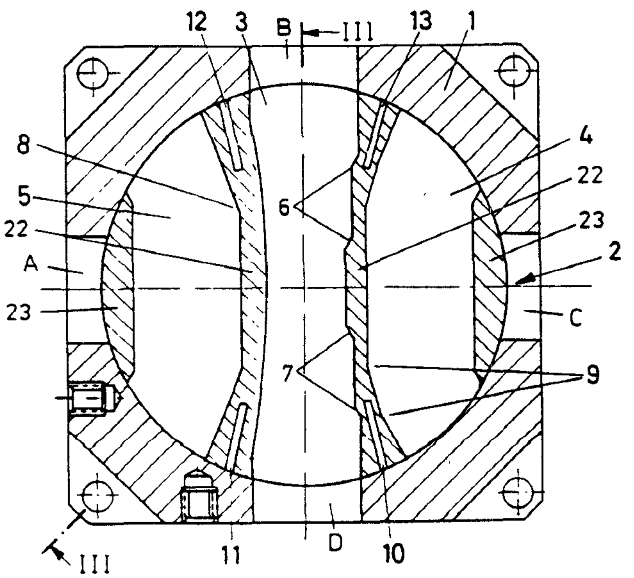
4,967,170 Oct. 30, 1990

Rotary Waveguide Switch Having Arcuate Waveguides Realized by Planar Faces

Inventors: Eckart Hettiage and Gerd Ruff.
Assignee: Teldix GmbH.
Filed: Jan. 28, 1987.

Abstract—A waveguide switch with four outputs or inputs (A, B, C, D) normally has one rotor (2) with three passages (3, 4, 5) with which, as appropriate, two waveguide connections can be effected in specific rotor positions. In two switching positions only the central waveguide passage (3) conducts HF signals, whereas in the two other switching positions both curved passages (4, 5) simultaneously conduct HF signals. Whereas the transmission losses in the central passage are low, a very high reflection level has hitherto been obtained in the two curved passages because of the points of inflexion. In order to improve the transmission characteristics, it is proposed to design the curved passages with an elliptical shape. For this, the longitudinal passage (3) is narrowed toward the central point of the rotor, so that sufficient space is provided for the curved portion of the lateral passages. The circular shape of the curved passages (4, 5) can also be approximated by a facet-like shaping of the sidewalls. The points of inflexion (8 or 9) thus created result in only insignificant changes in the transmission characteristics.

5 Claims, 2 Drawing Sheets



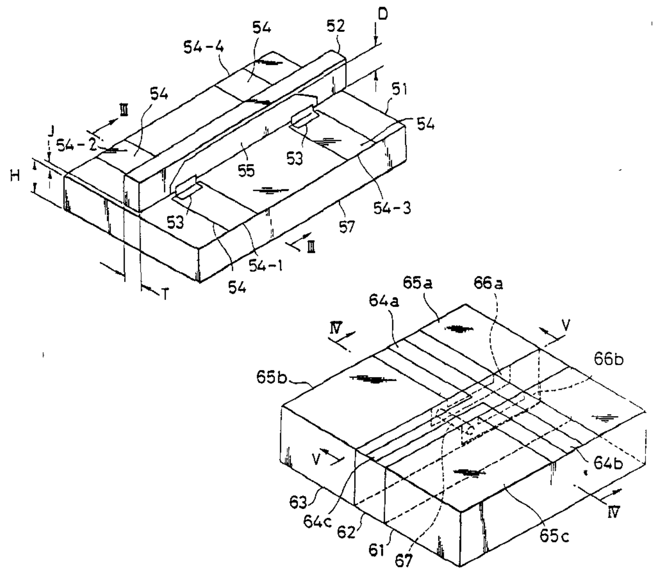
4,967,171 Oct. 30, 1990

Microwave Integrated Circuit

Inventors: Kazuhiro Ban and Atsuo Ojima.
Assignee: Mitsubishi Danki Kabushiki Kaisha.
Filed: Aug. 4, 1988.

Abstract—In a microwave integrated circuit, circuit elements such as microstrip coupled lines or interconnecting lines are formed on a separate substrate which is installed vertically between two halves of an input/output transmission-line substrate, or which is installed vertically on the surface of the input/output transmission-line substrate. Microwave integrated circuits with this configuration can be mass-produced at a low cost, can tolerate high applied power levels, and are smaller than conventional microwave integrated circuits.

14 Claims, 13 Drawing Sheets



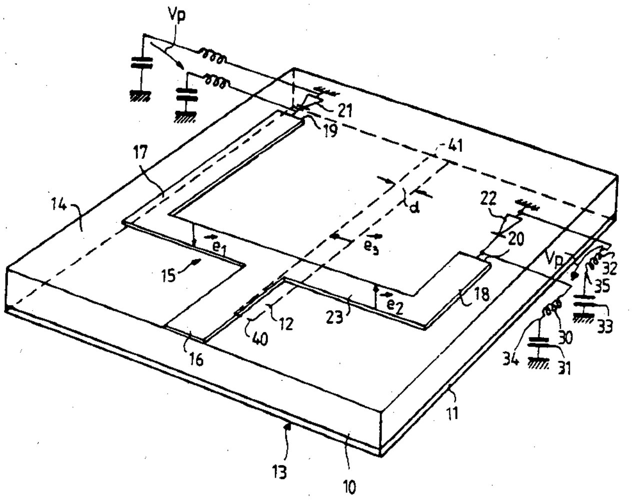
4,967,172 Oct. 30, 1990

Microwave Phase Shifter Circuit

Inventors: Joëlle Ariel and Jacques Legendre.
Assignee: Thomson-CSF.
Filed: Mar. 28, 1989.

Abstract—Disclosed are microwave phase shifter circuits that achieve phase shifts of elementary values and of whole number multiples of the values. The phase shifter circuit is made by utilizing of strip lines arranged in candlestick form on one face of a substrate and a slot line arranged on the other face. The length of the branches of the candlestick differ by $b/4$, b being the wavelength, and the ends of the branches are short-circuited or not short-circuited by utilizing of diodes which can be forward biased or reverse biased.

6 Claims, 4 Drawing Sheets



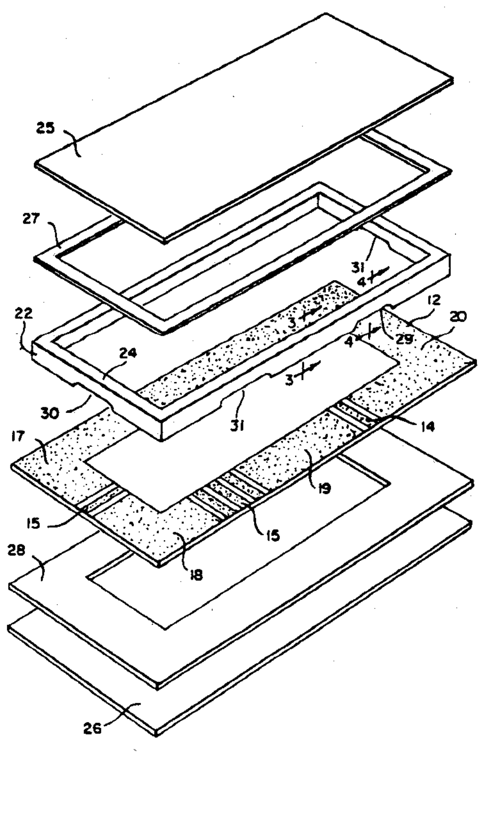
4,967,315 Oct. 30, 1990

Metallized Ceramic Circuit Package

Inventor: Robert L. Schelhorn.
Assignee: General Electric Company.
Filed: Jan. 2, 1990.

Abstract—The individual components of a shielded ceramic, RF mounting package are metallized on three of their outer surfaces. The package includes circuit supporting ceramic substrate metallized along its edges as well as on the horizontal surfaces to permit continuous metal contact between the substrate and a metallized ceramic seal ring and the metal lid and base of the package.

2 Claims, 2 Drawing Sheets



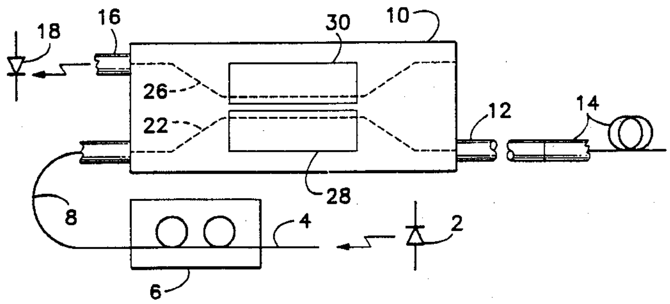
4,968,112 Nov. 6, 1990

Apparatus for Providing Depolarized Light

Inventors: Peter S. Lovely, Leon McCaughan, and Edwin B. Osgood.
Assignee: Smiths Industries Aerospace and Defense Systems Incorporated.
Filed: Jan. 4, 1990.

Abstract—Apparatus for depolarizing light received from a source of light comprises a body of material that defines an optical waveguide, the material of the body and the length of the waveguide being such that when polarized light is propagated through the waveguide, light in one of two polarization eigen states is retarded relative to light in the other polarization eigen state by a time such as to destroy phase coherence between the polarization eigen states of the light emitted by the source. The relative amplitudes of the two polarization eigen states of polarized light entering the wave-guide are adjusted.

6 Claims, 1 Drawing Sheet



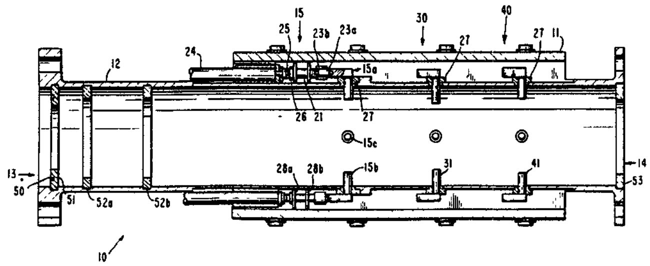
4,968,957 Nov. 6, 1990

Transmit and Receive Diplexer for Circular Polarization

Inventors: Thomas Hudspeth and Fritz Steinberg.
Assignee: Hughes Aircraft Company.
Filed: May 31, 1989.

Abstract—A diplexer for processing polarized energy at separate transmit and receive frequencies. The nature of the polarization may be circular, linear or elliptical depending upon the phasing associated therewith. The diplexer comprises a waveguide having first and second ports disposed at ends thereof. A symmetrical bandpass resonator arrangement is disposed around the periphery of the waveguide and couples energy at the receive frequency out of the waveguide. A symmetrical bandstop resonator arrangement is also disposed around the periphery of the waveguide and filters energy at the receive frequency to prevent coupling of received energy to the second port. The bandpass resonators of each of the resonator arrangements generally include tuning members that control the amount of energy coupled from the waveguide and that adjust and balance the polarization components of the energy to maintain the polarization state thereof. A plurality of tuning rings may be disposed adjacent to the first port that compensate for the impedance mismatch caused by external components coupled to the waveguide. A tuning ring may also be provided at the second port that compensates for impedance mismatch caused by the resonator arrangements. The diplexer is generally an overmoded structure that permits the propagation of higher order modes in the received energy. The symmetry provided in the bandpass resonator arrangement inhibits or prevents the excitation of these higher order modes and hence received energy not coupled out of the diplexer through the second port. Similarly, the symmetrical nature of the bandstop resonator arrangement also inhibits scattering of higher order modes and hence, improves the performance of the diplexer.

8 Claims, 3 Drawing Sheets



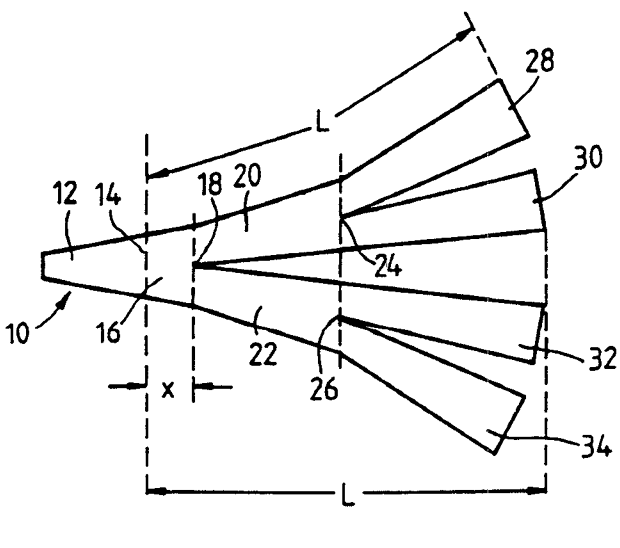
4,968,958 Nov. 6, 1990

Broad Bandwidth Planar Power Combiner/Divider Device

Inventor: Percy W. Hoare.
Assignee: U.S. Philips Corporation.
Filed: Aug. 22, 1989.

Abstract—A planar power combiner/divider device comprises a metallic layer on an insulating substrate. The metallic layer is configured to have an output (input) neck portion (12) which extends into a purely tapered portion (16) which in turn splits into n tapering conductors (1 to 5), the terminal portions of which constitute input (output) ports. The overall length (L) of the metallic layer between a junction (14) of the neck and purely tapering portions to each input (output) port being substantially constant and equal to substantially half the wavelength of the lowest design frequency and the distance x from the junction (14) to the (first) split into tapering conductors is selected so as to avoid transverse resonance at the desired frequencies.

7 Claims, 2 Drawing Sheets



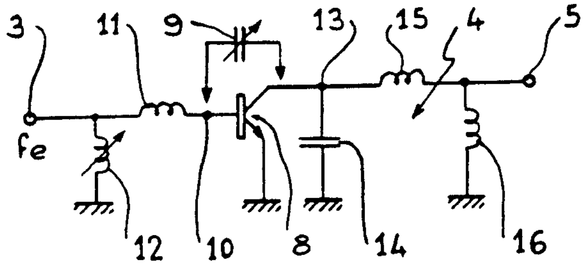
4,968,959 Nov. 6, 1990

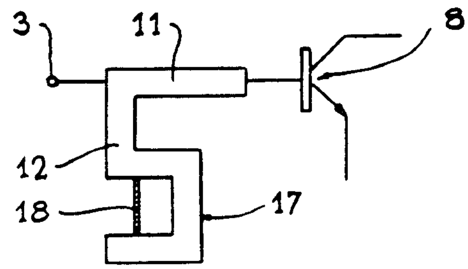
Microwave Frequency Divider

Inventor: Philippe Levy.
Assignee: Alcatel N.V.
Filed: Sept. 21, 1989.

Abstract—An analog type of microwave frequency divider for dividing frequency by two. It comprises a common emitter transistor (8) and a feedback loop comprising a filter (9, 11) and a phase-adjusting inductor (12). The filter (9, 11) is tuned to half the input frequency (fe/2) and the transistor (8) operates in its non-linear region. The two inductors (11, 12) are made of microstrip. The divider also includes an output matching filter comprising a capacitance (14) and two inductors (15, 16) that are likewise both made of microstrip.

5 Claims, 1 Drawing Sheet





4,969,701 Nov. 13, 1990

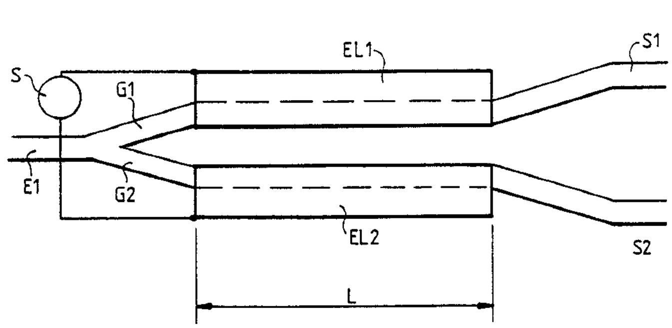
Integrated Electrooptical Modulator/Commutator with Pass-Band Response

Inventors: Michel Papuchon and Yannic Bourbin.
Assignee: Thomson-CSF.
Filed: July 15, 1988.

Abstract—A modulator/commutator comprises two optical guide waves coupled to each other on a length and connected to an input guide by a Y junction. Electrodes are associated with each wave guide and enable the application of an interaction field on an interaction length. The optical and electrical waves have different propagation speeds. The interaction length and the coupling length are fixed so that their ratio has a value enabling an optical wave to successively experience the positive and negative alternations of an alternating field applied to the device by the electrodes, thus simulating

a multiple-section operation. This device gives 100% efficiency of switching over to either of the two optical guides.

7 Claims, 7 Drawing Sheets



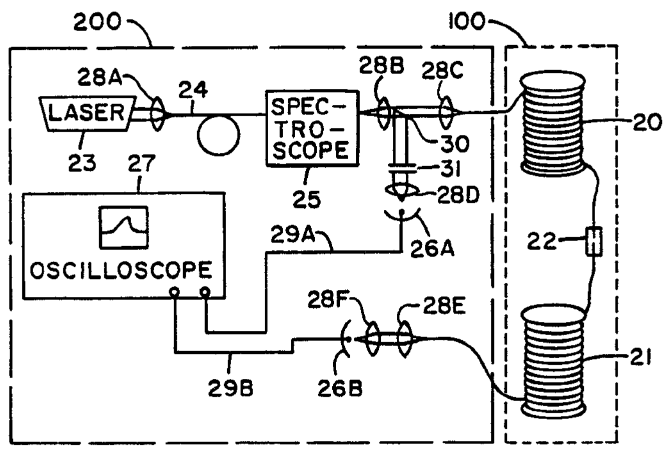
4,969,710 Nov. 13, 1990

Optical Fiber Transmission Path with Dispersion Compensation

Inventors: Paul A. Tick and Seiko Mitachi.
Assignee: Corning Incorporated.
Filed: Apr. 5, 1989.

Abstract—An optical fiber transmission path wherein total dispersion of the system is compensated by use of fibers composed of glasses with total dispersion of opposite signs at the operating wavelength for the system. With silicabased fibers, CdF_2-LiF-AlF_3-PbF_2-KF-YF_3 fluoride glass-based fibers may be used for a system wih 1.55-μm operating wavelength.

18 Claims, 3 Drawing Sheets



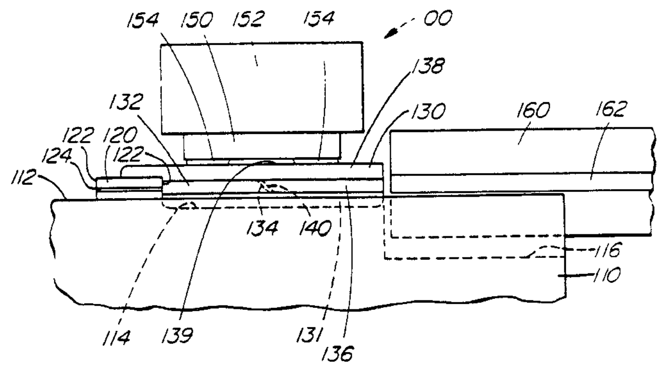
4,969,712 Nov. 13, 1990

Optoelectronic Apparatus and Method for Its Fabrication

Inventors: William D. Westwood, Herman W. Willemsen, Michel I. Gallant, and Richard P. Skillen.
Assignee: Northern Telecom Limited.
Filed: June 22, 1989.

Abstract—An edge emitting optoelectric source is integrally formed on a surface of a semiconductor substrate. An optical waveguide is integrally formed on the same surface of the substrate adjacent to the source. The waveguide is aligned with the source for optical coupling of the source to the waveguide. The waveguide comprises an optical diverter for diverting at least a portion of any light propagating along the waveguide toward the source through a surface of the waveguide. An optoelectronic detector is secured to that surface of the waveguide through which light is diverted for receiving light diverted through that surface. The resulting optoelectronic apparatus is suitable for launching and detecting optical signals in large volume bidirectional optical fiber transmission systems.

19 Claims, 2 Drawing Sheets



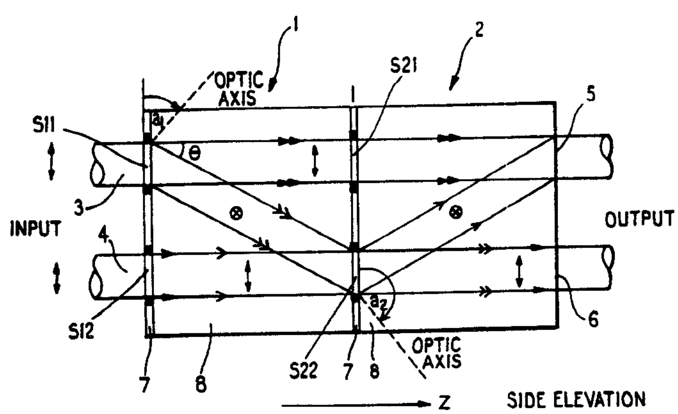
4,969,717 Nov. 13, 1990

Optical Switch

Inventor: Stephen R. Mallinson.
Assignee: British Telecommunications Public Limited Company.
Filed: June 3, 1988.

Abstract—An optical switch includes a series of $2(n-1)$ macrocells each having a variable polarization rotating cell and a birefringement cell. Each rotating cell is divided into individually addressable and switchable subcells. Some of the macrocells have birefringent cells having a first orientation. In these macrocells, subcells switch light passing through position Pi to either position Pi or Pi + 1 of the rotating cell of the next macrocell in the series. Other macrocells have birefringent cells having a second orientation. In these macrocells, the subcells switch light passing through position Pi to either position Pi or Pi − 1 of the rotating cell of the next macrocell in the series. The subcells of the macrocells are positioned such that light from any one of several inputs is switchable independently to any one of several outputs.

18 Claims, 4 Drawing Sheets



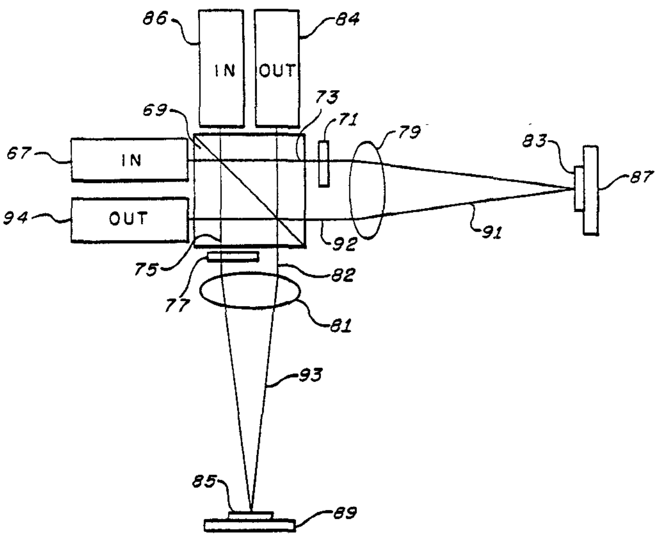
4,969,720 Nov. 13, 1990

Magnetooptic Bypass Switch

Inventors: Stanley J. Lins and David L. Fleming.
Assignee: Unisys Corporation.
Filed: Sept. 5, 1989.

Abstract—An optical bypass switch receives arbitrarily polarized light from an input optical fiber which is divided into the *P* and *S*-polarized light beams by a polarization beamsplitter. These *P* and *S*-polarized light beams are focussed to a magneto-optic garnet wherein the plane of polarization is rotated in accordance with a desired switching function and directed to an output optical fiber determined by the polarization rotation state established in the magnetooptic garnet.

14 Claims, 4 Drawing Sheets



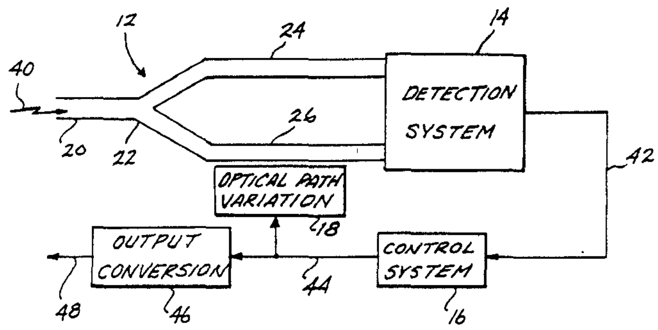
4,969,742 Nov. 13, 1990

Integrated Optic Wavemeter

Inventors: R. Aaron Falk and Loren E. Laybourn.
Assignee: The Boeing Company.
Filed: June 27, 1989.

Abstract—A wavemeter fabricated using integrated optics technology. A waveguide structure is formed in a substrate, the structure including signal and reference waveguides and means for coupling an optical input signal into both waveguides. Means are provided for varying the optical path length of the signal waveguide with respect to the reference waveguide in response to a control signal. Optical signals passing through the waveguides are coupled to a detection system that produces a feedback signal having a characteristic that is a function of the optical path length difference between the waveguides, and of the wavelength of the optical input signal. A control system receives the feedback signal and produces the control signal such that the feedback signal characteristic is driven towards a predetermined value. The control signal then provides a measure of the wavelength of the optical input signal.

10 Claims, 2 Drawing Sheets



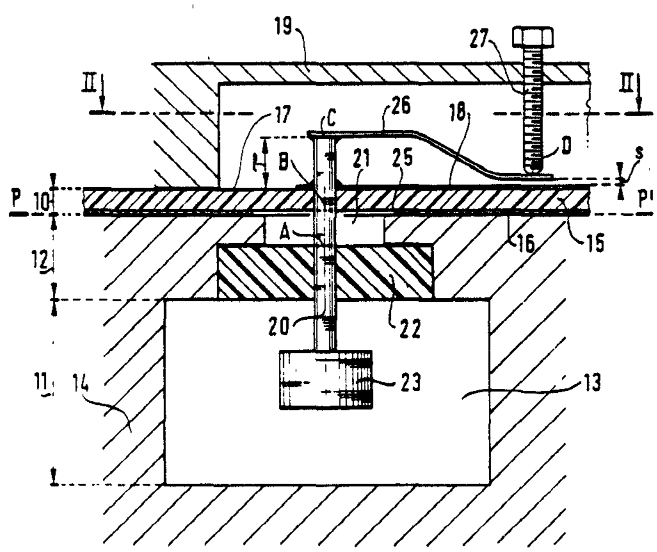
4,970,477 Nov. 13, 1990

Microwave Adjustment Device for a Transition Between a Hollow Waveguide and a Plane Transmission Line

Inventors: Mustafa Gurcan and Patrick Menuge.
Assignee: Alcatel, N.V.
Filed: Mar. 22, 1989.

Abstract—A microwave adjustment device for a transmission between a hollow waveguide (11) and a plane transmission line (10), the device comprising: an intermediate coaxial waveguide (12) comprising a core (20) whose first end opens out into the hollow waveguide and terminates in an antenna (23) and whose second end passes through the substrate on which the plane transmission line is deposited; a curved metal tape (26) having a first end fixed to the second end of the core (20); and a screw (27) fixed to the second end of a tape (26) in order to adjust the gap between the second end and the transmission line (18). The invention is applicable to microwave beam telecommunications.

8 Claims, 2 Drawing Sheets



4,970,478 Nov. 13, 1990

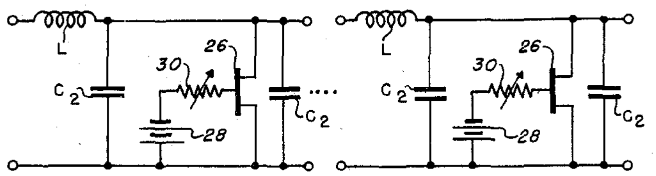
Matched Microwave Variable Attenuator

Inventor: Scott A. Townley.
Assignee: Honeywell, Inc.
Filed: June 14, 1989.

Abstract—A variable attenuator includes a plurality of circuit cells, each containing a variable resistance shunt element, cascaded to form an artificial

transmission line with distributed loss represented by the variable resistance shunt element. Parameters of the transmission line are chosen in a manner to establish a characteristic impedance that is substantially independent of the shunt resistance value and to provide low insertion reflection coefficients for all attenuation values.

9 Claims, 3 Drawing Sheets



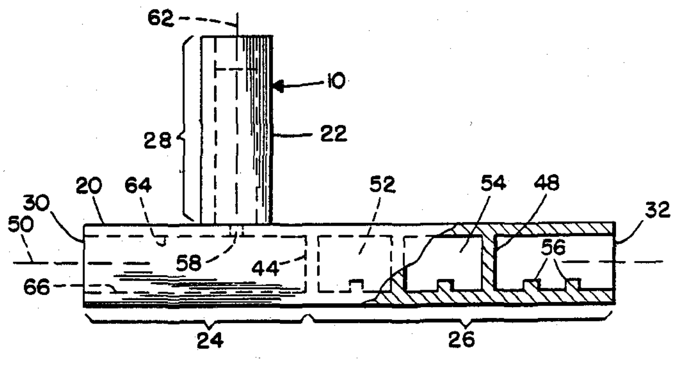
4,970,480 Nov. 13, 1990

Microwave Diplexer

Inventors: Mon N. Wong, Gregory D. Kroupa, and Thomas F. Foster, Jr.
Assignee: Hughes Aircraft Company.
Filed: June 9, 1989.

Abstract—A diplexer for electromagnetic signals of higher and lower frequency is formed of a common waveguide channel for both signals, the common channel branching into a through waveguide channel and a side waveguide channel. The through channel includes a filter having a pass band for propagation of the lower frequency signal and inhibiting propagation of the higher frequency signal. The side channel is formed as a waveguide below cut-off frequency with respect to the lower frequency signal for inhibiting propagation of the lower frequency signal while permitting propagation of the higher frequency signal. A coupling aperture formed as a slot resonant at the higher frequency is located in a waveguide wall at an integral number of quarter guide wavelengths in front of the filter for coupling the higher frequency signal between the common and the side channels.

5 Claims, 2 Drawing Sheets



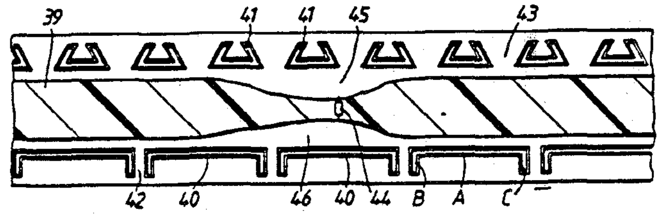
4,970,522 Nov. 13, 1990

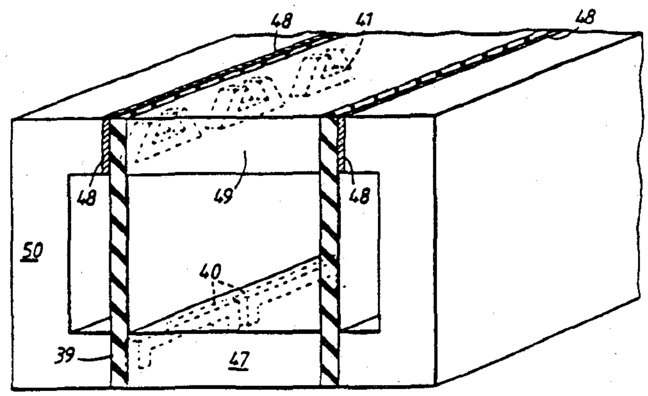
Waveguide Apparatus

Inventor: Murray J. Niman.
Assignee: Marconi Electronic Devices Limited.
Filed: Aug. 11, 1989.

Abstract—Waveguide apparatus in which a dielectric substrate is placed between sections of a waveguide. The dielectric substrate incorporates slots arranged in a linear fashion and having extended portions, there being a narrow gap between adjacent slots. This enables accurate control of radiation losses through the dielectric layer sandwiched between the sections of the waveguide to be achieved.

29 Claims, 6 Drawing Sheets





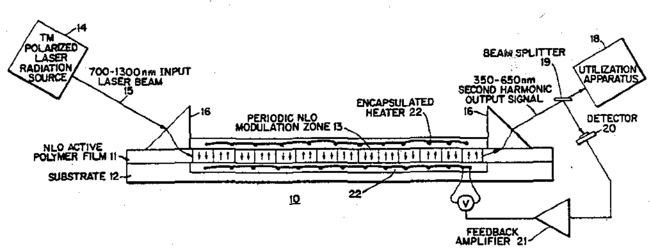
4,971,416 Nov. 20, 1990

Polymeric Waveguide Device for Phase Matched Second Harmonic Generation

Inventors: Garo Khanarian and Robert Norwood.
Assignee: Hoechst Celanese Corp.
Filed: Sept. 11, 1989.

Abstract—In one embodiment this invention provides a parametric frequency converting device that comprises a thin film of a polymeric medium that exhibits second order nonlinear optical response, and the device has heat control means for temperature tuning of the waveguide medium to phase match the propagation constants of fundamental and second harmonic light beams. In a preferred device the waveguiding medium has a spatial periodic structure for quasi-phase matching of the propagating wave energy, and optionally has a set of electrodes for application of a direct current electric field to the waveguiding medium.

18 Claims, 2 Drawing Sheets



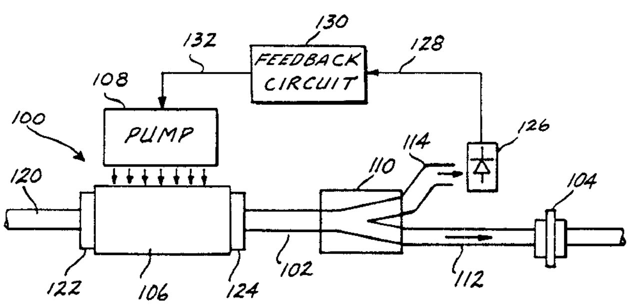
4,971,417 Nov. 20, 1990

Radiation-Hardened Optical Repeater

Inventors: Jeffrey A. Krinsky and Raymond D. Rempt.
Assignee: The Boeing Company.
Filed: Aug. 23, 1989.

Abstract—An optical repeater that amplifies and reshapes an input pulse without converting the pulse into the electrical domain. The repeater comprises an optical gain device, a mode selector, and an optical thresholding material. The optical gain device comprises an optical gain material with antireflection coatings at its input and output ports. The mode selector receives an optical signal amplified by the gain medium, and preferentially transmits one or more preselected spatial modes to the thresholding material, which shapes the pulses for retransmission.

14 Claims, 2 Drawing Sheets



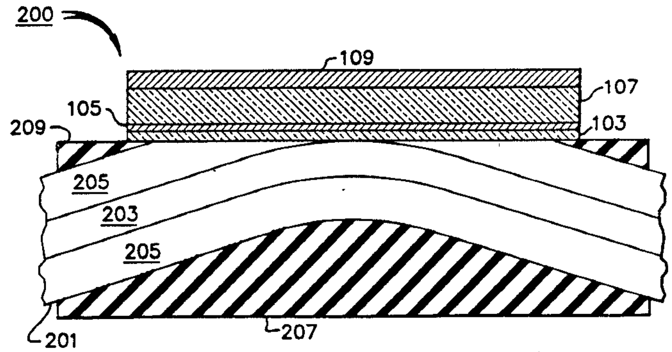
4,971,426 Nov. 20, 1990

Optical Article for Reflection Modulation

Inventors: Jay S. Schildkraut, Christopher B. Rider, and Michael Scozzafava.
Assignee: Eastman Kodak Company.
Filed: Oct. 11, 1989.

Abstract—An optical article is disclosed capable of modulating the reflection of electromagnetic radiation containing a reflective metal layer having a thickness of less than 0.5 μm, an optical coupler for directing polarized electromagnetic radiation to the reflective metal layer and serving as a support for the device, a first dielectric layer interposed between the reflective metal layer and the support having a thickness in the range from 0.1 to 10 times the wavelength of the electromagnetic radiation, a second dielectric layer adjacent to the reflective metal layer exhibiting a refractive index which differs from that of the first dielectric layer by less than 20 percent and can be adjusted by an applied electrical potential gradient, and means for variably applying an electrical potential to a surface of the second dielectric layer remote from the reflective metal layer. The second dielectric layer is a polymeric layer coated on the reflective metal layer exhibiting a second order polarization susceptibility greater than 10^{-9} electrostatic units and comprised of polar aligned molecular dipoles having an electron donor moiety linked through a conjugated π bonding system to an electron acceptor moiety.

26 Claims, 2 Drawing Sheets



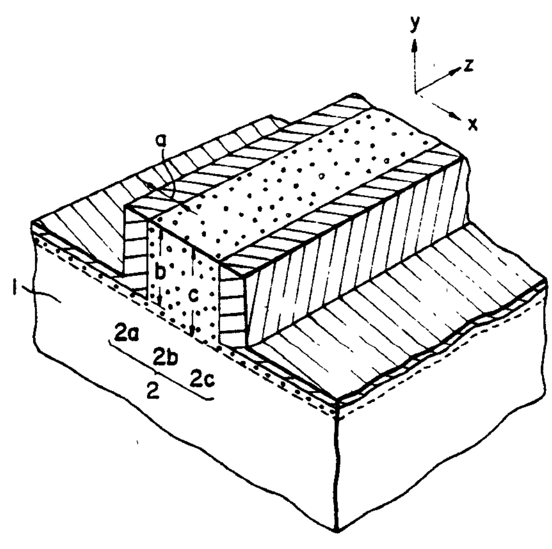
4,973,117 Nov. 27, 1990

Secondary Harmonic Generator Having Waveguides for a Laser Beam

Inventor: Masahiro Yamada.
Assignee: Sony Corporation.
Filed: Oct. 10, 1989.

Abstract—An optical wavelength conversion device, which is provided with a rigid type waveguide for efficiently converting a fundamental wave into the secondary harmonic wave and emitting the latter in the form of a beam circular or elliptic shape in section, and a process for manufacturing the ridge type waveguide. The optical wavelength conversion device essentially includes: an optical waveguide formed on a substrate of a nonlinear optical material so as to generate a secondary harmonic wave by Cerenkov radiation, and which has a first waveguide passage for confining a fundamental wave and converting it into the secondary harmonic wave, and a second waveguide passage for confining the generated secondary harmonic wave and propagating it toward an end face for emission therefrom.

3 Claims, 3 Drawing Sheets



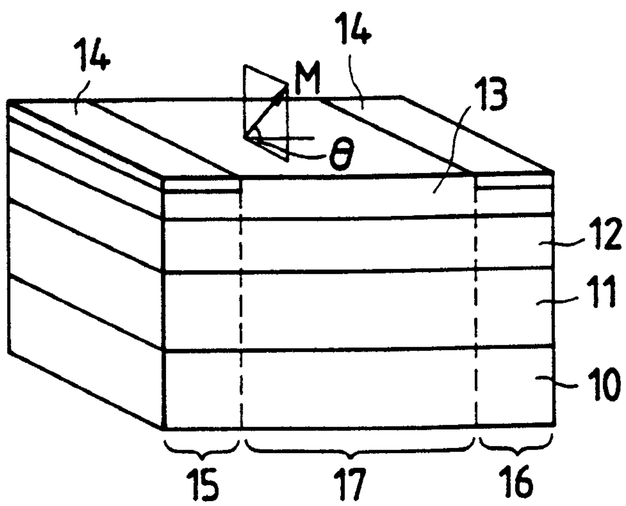
4,973,119 Nov. 27, 1990

Optical Waveguide Isolator

Inventor: Kanzunari Taki.
Assignee: Brother Kogyo Kabushiki Kaisha.
Filed: June 19, 1989.

Abstract—An optical isolator serving as a unidirectional waveguide for preventing light reflected by various optical devices from being applied to a semiconductor laser. The optical isolator includes a mode converter for effecting a mode conversion of a light beam. The mode converter comprises a magnetic thin film having magnetooptic effects, and a substrate having a refractive index relatively close to the refractive index of the magnetic thin film. The mode converter is magnetized in a direction lying in a plane substantially normal to the direction in which light is propagated through the mode converter and inclined to the surface of the magnetic thin film.

3 Claims, 3 Drawing Sheets



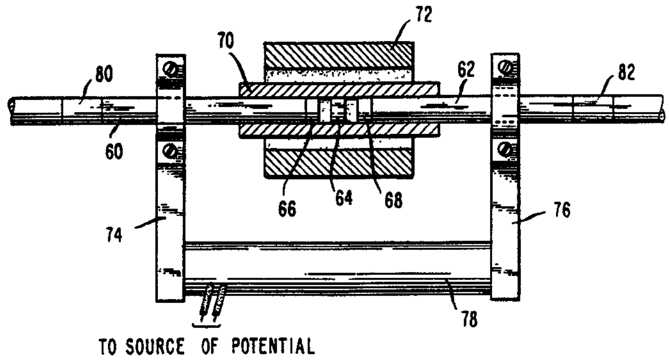
4,973,120 Nov. 27, 1990

Optical Isolator with Resonant Cavity Having Gyrotropic Material

Inventors: Robert M. Jopson and Julian Stone.
Assignee: AT&T Bell Laboratories.
Filed: May 1, 1989.

Abstract—The invention is an optical isolator. In one embodiment the optical isolator comprises two linear polarizers, one at the input of the isolator and the other at the output. Positioned between the input and the output linear polarizer is a gyrotropic medium located within a resonator cavity such as a Fabry-Perot cavity. Interposed between the linear polarizer at the input of the isolator and the resonant cavity is a first polarization conversion means for converting received plane polarized optical energy from said linear polarizer to circularly polarized optical energy and interposed between the resonant cavity and the linear polarizer at the output of the isolator is a second polarization conversion means for converting received circular polarized optical energy from said resonant cavity to plane polarized optical energy. In an embodiment, the resonant cavity comprising the gyrotropic medium becomes the filtering medium to block reflected optical radiation.

7 Claims, 2 Drawing Sheets



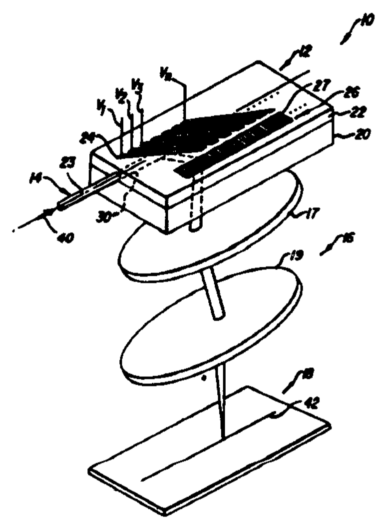
4,973,121 Nov. 27, 1990

Scanner

Inventors: Chris P. Brophy and Sanwal P. Sarraf.
Assignee: Eastman Kodak Company.
Filed: Aug. 9, 1989.

Abstract—A scanner is disclosed that uses an electrooptic deflector to deflect a light beam onto a receiving medium. The deflector comprises a substrate formed of an optical material and a thin film optical waveguide fabricated on a top surface thereof. An array of parallel metallic electrodes are formed on the waveguide. Each of the electrodes is adapted to receive a voltage independently of the other electrodes. When a voltage is supplied to an electrode, a spatial variation in the index of refraction occurs across the thickness of the waveguide, and this spatial variation is used to deflect a light beam. In order to use the waveguide to scan a light beam across the receiving medium, the light beam across the receiving medium, the light beam is supplied to the waveguide in a direction transverse to the electrodes, and a voltage is sequentially supplied to the electrodes.

9 Claims, 2 Drawing Sheets



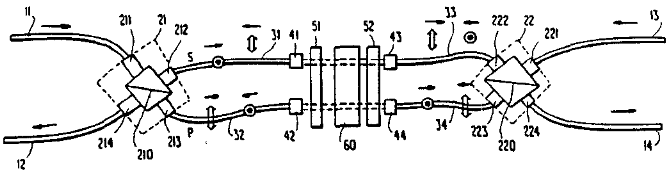
4,973,124 Nov. 27, 1990

Wavelength Drop-and-Insert Device

Inventor: Kazuhisa Kaede.
Assignee: NEC Corporation.
Filed: Dec. 22, 1989.

Abstract—The invention relates to an optical wavelength drop-and-insert device including two sets of input/output optical fibers attached to two terminals on each of a first and second polarization beam splitter. The first polarization beam splitter splits incoming light into two linearly orthogonal polarizations which are transmitted via a first and second polarization preserving fiber through a first and second quarter wave plate for changing the subject beams into circular polarization. An optical filter is included to transmit or reflect light from the quarter wave plates according to a wavelength based transmission/reflection characteristic. The second polarization beam splitter then acts as a combiner for the circularly polarized light which is received via a third and fourth polarization preserving fibers and then is transmitted via an output optical fiber. The second polarization beam splitter splits incoming light into two orthogonal polarizations via an incoming optical fiber for two way operation. A second embodiment of the invention uses a first and second optical filter which can be a Fabry Perot or Bragg diffraction grating type optical fiber.

4 Claims, 4 Drawing Sheets



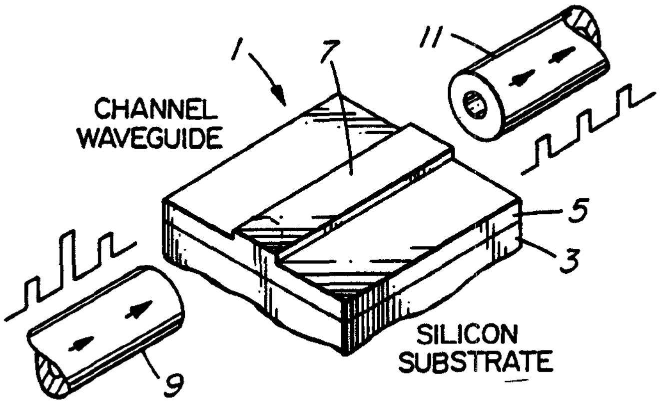
4,973,125 Nov. 27, 1990

All Optical Self Limiter for Fiber Optics

Inventor: Richard J. F. Normandin.
Assignee: National Research Council of Canada.
Filed: Aug. 25, 1989.

Abstract—All optical self limiters in a geometry suitable for use in a fiber optics context are disclosed. Edge coupled light to a silicon thin layer on a doped silicon substrate lowers the refractive index of the layer and eventually brings it to the waveguide cut off condition. In a further embodiment, by varying the amount of light incident on the nonlinear substrate and the nonlinear channel, a fully adjustable limiting action is obtained.

27 Claims, 4 Drawing Sheets



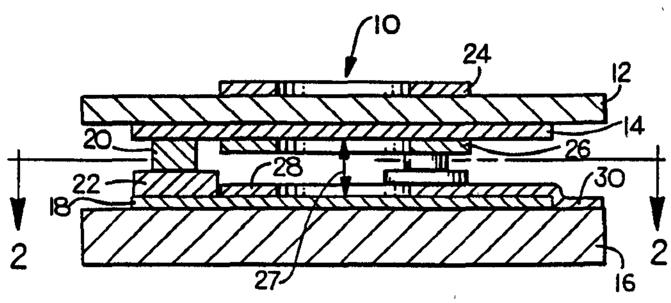
4,973,131 Nov. 27, 1990

Modulator Mirror

Inventor: Rex G. Carnes.
Assignee: McDonnell Douglas Corporation.
Filed: Feb. 3, 1989.

Abstract—This modulator mirror comprises at least two partially transparent reflector stacks bonded to two separate substrates held apart by spacers to create a parallel gap between the partially transparent reflector stacks wherein the gap has a reference spacing of an even number of quarter wavelengths of the light energy contained within the beam to be modulated. The modulation is accomplished by causing a physical displacement between the two substrates such that the gap spacing varies between the reference pass position of the even number of quarter wavelengths and a second reference no pass position of about ± one quarter wavelength. The physical motion may be accomplished by electrostatic, piezo-electric, magnetic or other means.

3 Claims, 3 Drawing Sheets



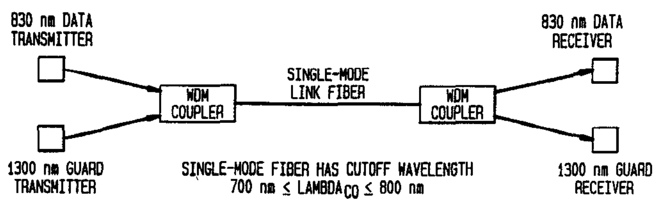
4,973,169 Nov. 27, 1990

Method and Apparatus for Securing Information Communicated through Optical Fibers

Inventor: Mark H. Slonecker.
Assignee: Martin Marietta Corporation.
Filed: June 7, 1989.

Abstract—This invention relates to a technique for protecting information from intrusion that is transmitted through optical fiber. The new method relates to transmitting energy at multiple wavelengths along a single mode optical fiber. The wavelengths can be propagated in single mode or alternatively in single mode or in high order modes. Energy at one or more wavelengths constitutes guard channels which have an enhanced power loss effect by selection of an appropriate cut-off wavelength of the single mode optical fiber. These guard channels can be monitored for power loss to detect intrusion. An apparatus is also described.

20 Claim, 3 Drawing Sheets



BLOCK DIAGRAM OF IROC CONCEPT

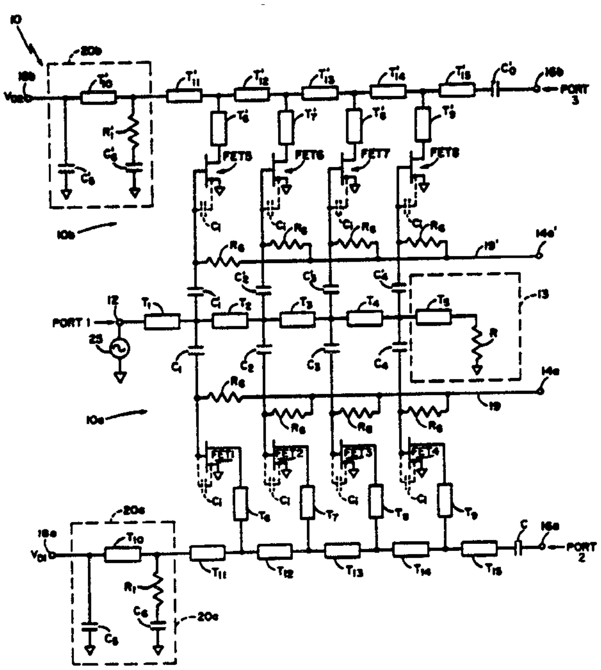
4,973,918 Nov. 27, 1990

Distributed Amplifying Switch/RF Signal Splitter

Inventor: Manfred J. Schindler.
Assignee: Raytheon Company.
Filed: Dec. 27, 1988.

Abstract—A distributed circuit includes a plurality of field effect transistors (FET's), each one of such FET's having gate, drain and source electrodes, with a first portion, or a first channel, of such FET's having gate electrodes and drain electrodes successively coupled between a first input terminal and a first output terminal, and a second like portion or a second channel of such FET's having gate electrodes and drain electrodes successively coupled between the first input terminal and a second output terminal. Separate bias circuits are provided to the input electrodes and the output electrodes of the first and second channels. Bias signals fed to the input bias circuits and coupled to the input electrodes to place the FET's in an "on" state to provide gain to RF input signals fed thereto, or in a "pinch-off" state to isolate RF signals fed to the input electrodes of the FET's. Accordingly, a 1×2 signal splitter or a 1×2 switch that provides gain to a signal is provided.

12 Claims, 2 Drawing Sheets



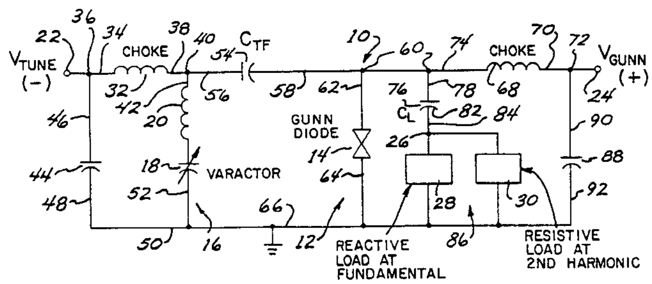
4,973,921 Nov. 27, 1990

Millimeter Wave, Lumped Element, VCO with Ultrabroadband Tuning

Inventors: Leonard D. Cohen and Eugene S. Sard.
Assignee: Eaton Corporation.
Filed: Aug. 28, 1989.

Abstract—A varactor oscillator (10), VCO, operational in the millimeter wave range including frequencies greater than 30 GHz, includes a lumped element active circuit (12) with a negative resistance, a lumped element tuning circuit (16) coupled to the active circuit and providing resonant circuitry in combination therewith, and a VCO output (26) reactively terminated at the fundamental frequency of oscillation and generating a higher order output harmonic at least as high as the second order. The reactive termination at fundamental frequency eliminates the intrinsic diminishing effect on tuning range of resistive loading, to extend tuning range and provide an ultrabroadband VCO. The VCO output (26) is resistively loaded at the higher order harmonic. The output is obtained from the higher order harmonic generated in-situ in the active element (14). Measured performance included continuous tuning from 46–66 GHz, a 20 GHz tuning range, with a maximum power output of +6 dBm.

21 Claims, 5 Drawing Sheets



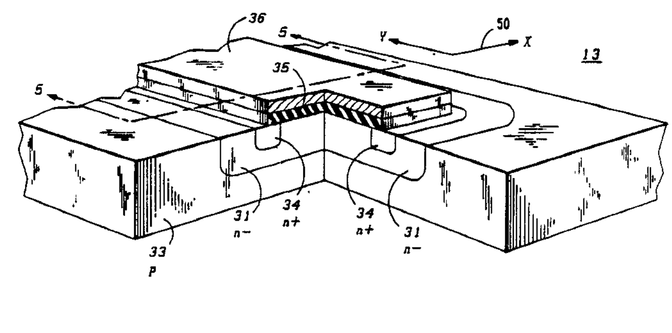
4,973,922 Nov. 27, 1990

Voltage Controlled Variable Capacitor and Oscillator Using It

Inventors: David M. Embree and Shawn M. Logan.
Assignee: AT&T Bell Laboratories.
Filed: Dec. 26, 1989.

Abstract—A voltage variable capacitor (VVC) having two terminals in a variable frequency crystal oscillator integrated into a common substrate with the oscillator circuitry isolated therefrom. The VVC is constructed using the same processing steps as the oscillator circuitry and achieves low series resistance and wide capacitance variation by utilizing a substrate or epitaxial layer (body) having a well with a diffused region therein. The region, of the same conductivity type as the well and a first one of the two terminals, forms a rectangular ring in the well. Over the region and insulated therefrom, a conductive layer is deposited to provide a second one of the two terminals. Both terminals are electrically isolated from the body.

11 Claims, 4 Drawing Sheets



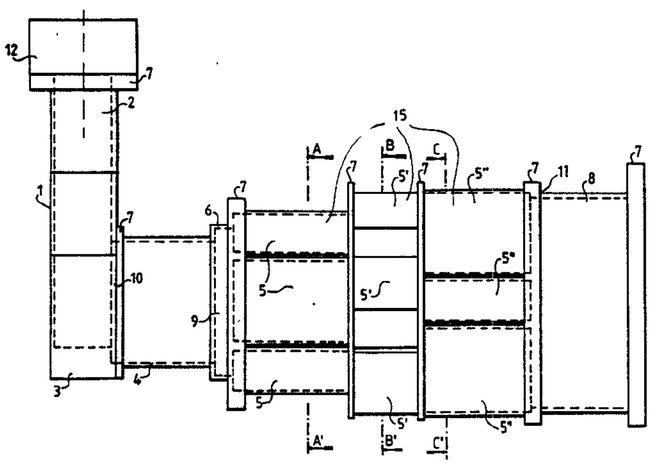
4,973,924 Nov. 27, 1990

Mode Converter for Microwave Power Transmission Circuit

Inventors: Jean-Pierre Bergero and Claude Coussnard.
Assignee: Thomson-CSF.
Filed: Feb. 21, 1989.

Abstract—The converter disclosed is interposed between a generator of electromagnetic waves and circular, output waveguide propagating the TE_{01} mode. It is formed by the series mounting of a rectangular waveguide, having one of its end closed and a circular waveguide propagating the TM_{01} mode, connected to the rectangular waveguide by a lateral opening, in such a way that the axes of the two waveguides are perpendicular, also included in the series mounting is a group of intermediate waveguides placed after the circular waveguide, distributed in a ring before its free end. Each intermediate waveguide is formed by a sequence of waveguide pieces working in the rectangular TE_{10} mode and gradually offset in rotation with respect to one another, in the same direction. The overall offset among the pieces of one and and the same intermediate guide will be 90°. The converter can be applied to the convention of modes in high power microwave transmission circuits.

7 Claims, 4 Drawing Sheets



4,973,925 Nov. 27, 1990

Double-Ridge Waveguide to Microstrip Coupling

Inventors: Marwan E. Nusair, Stephen R. Scholl, and Michael D. Valentine.
Assignee: Valentine Research, Inc.
Filed: Sept. 20, 1989.

Abstract—A method and apparatus for coupling a double-ridge waveguide to a microstrip circuit. A lower ridge of a coupling section of waveguide is expanded by gradually increasing its width such that at the beginning of the coupling the lower ridge is equal to the width of the lower ridge of the double-ridge waveguide to be coupled and at the end of the coupling the width of the lower ridge is equal to the full width of the coupling. This flaring of the lower ridge creates an electrically conductive surface for receiving a ground plane for the microstrip circuit. Additionally, the upper ridge is altered gradually such that at the beginning of the coupling the ridge gap is equal to the gap in the doubleridge waveguide and at the end of the coupling the ridge gap is equal to the sum of the thicknesses of the dielectric substrate, the microstrip line, and the ground plane of the microstrip circuit. The upper ridge is gradually tapered over the length of the coupling and then sharply tapered adjacent the microstrip end of the coupling so that the width of the upper ridge is changed to the width of the microstrip line and the impedance of the coupling matches the impedance of the microstrip circuit. The sidewalls of the coupling may also be tapered inwardly or outwardly if needed for impedance matching.

7 Claims, 3 Drawing Sheets