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, DC 20231.

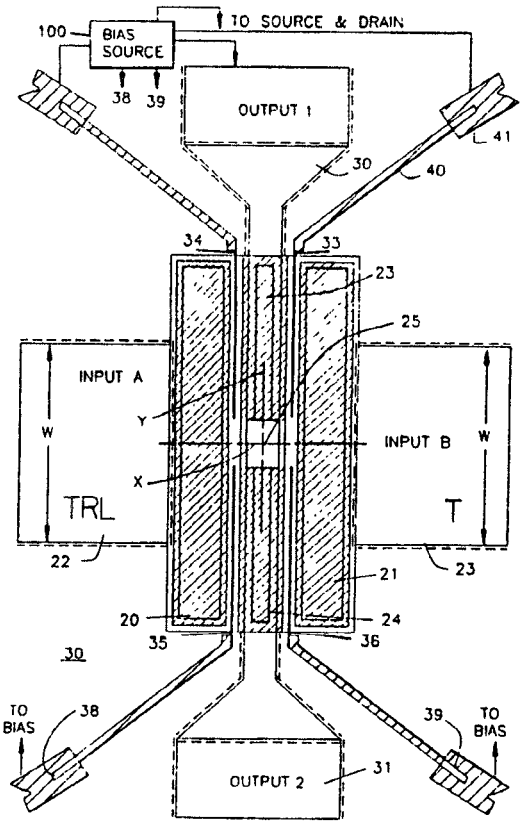
5,309,006 May 3, 1994

FET Crossbar Switch Device Particularly Useful for Microwave Applications

Inventors: David A. Willems and Victor E. Steel.
Assignee: ITT Corporation.
Filed: Nov. 5, 1991.

***Abstract*—An FET crossbar switch device is implemented by using a split gate electrode and a shared source and drain pad to implement source and drain electrodes on an integrated circuit substrate. First and second inputs to the device are associated with first and second transmission lines, each of which is directly connected to a first and second source electrode areas. Disposed between the source electrode areas are respective drain electrode sections, each of which is coupled to an associated output transmission line. The input and output transmission lines are fabricated directly on the integrated circuit substrate. Gate fingers or electrodes are directed between respective drain electrodes and adjacent source electrodes. By properly biasing the gate electrodes, one can direct the first input to the first output with the second input directed to the second output. In a second state the first input can be connected to the second output with the second input disconnected or connected to the first output. In this manner, the device operates as a crossbar switch while providing extremely efficient operation at high microwave frequencies due to the symmetry of the device as employing transmission line geometry. The construction of the device reduces the need for matching networks. The entire device is implemented by microwave monolithic integrated circuit techniques and is extremely reliable and efficient.**

20 Claims, 4 Drawing Sheets



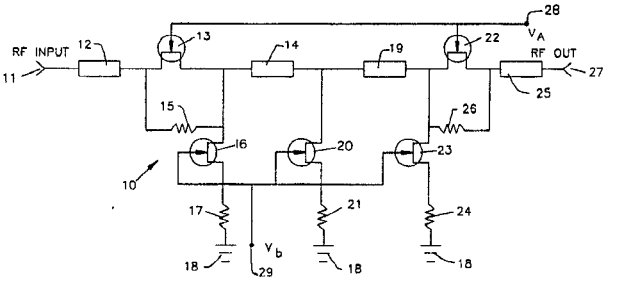
5,309,048 May 3, 1994

Distributed Digital Attenuator

Inventor: R. Brian Khabbaz.
Assignee: ITT Corporation.
Filed: Sept. 24, 1992.

***Abstract*—A digital attenuator circuit for attenuating RF frequencies implemented as an MMIC having series microstrip transmission lines between an RF input terminal and an RF output terminal and having at least one shunt path comprised of a series combination of a MESFET able to be switched between a conducting state and a nonconducting state and a thin-film resistor, wherein the circuit employs a distributed topology whereby when the MESFET is in the conducting state the impedance of the microstrip transmission lines matches the impedance of the shunt elements thereby enabling the circuit to operate over a wide bandwidth.**

26 Claims, 6 Drawing Sheets



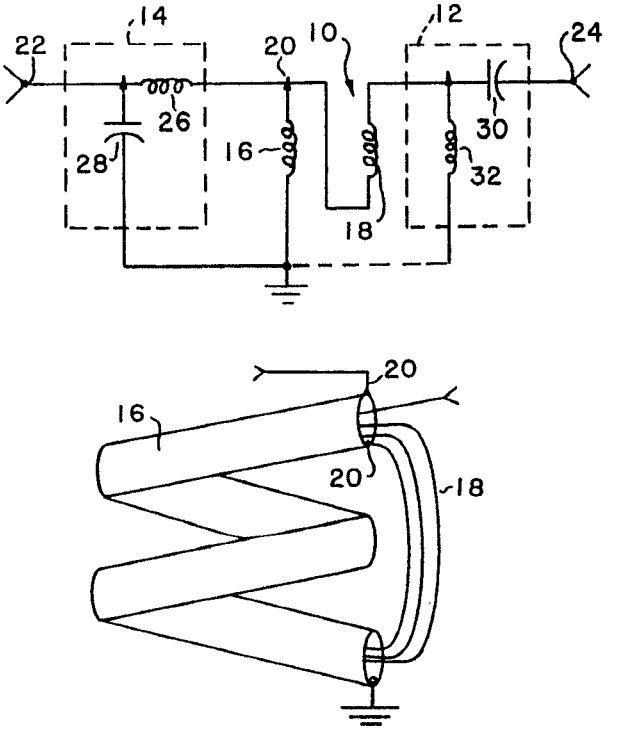
5,309,120 May 3, 1994

RF High Power, High Frequency, Non-Integer Turns Ratio Bandpass Auto-Transformer and Method

Inventor: Floyd A. Koontz.
Assignee: Harris Corporation.
Filed: Nov. 24, 1992.

***Abstract*—A high power, high frequency auto transformer with a non-integer turns ratio and a bandpass filter frequency response.**

22 Claims, 2 Drawing Sheets



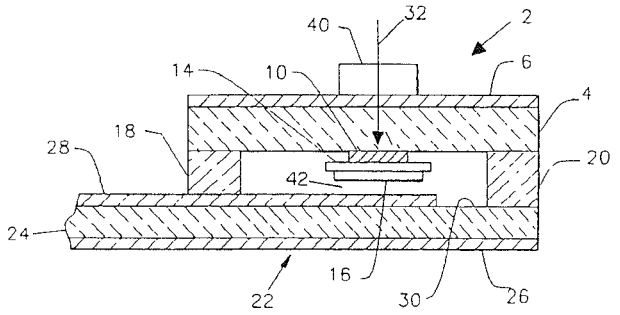
5,309,127 May 3, 1994

Planar Tunable YIG Filter

Inventor: Elio A. Mariani.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Dec. 11, 1992.

Abstract—A planar tunable YIG filter assembly comprising a first substrate having on one side thereof spaced ridges, a first conductor spaced from and between the ridges, a dielectric spacer and YIG disk is mounted on said spacer whereby, a bandpass filter is established between said first conductor and a second conductor that is orthogonal with said first conductor and on a second substrate that is in contact with the ridges when means are provided for producing a magnetic field that is perpendicular to the substrate in the area of intersection of the first and second conductors.

5 Claims, 2 Drawing Sheets



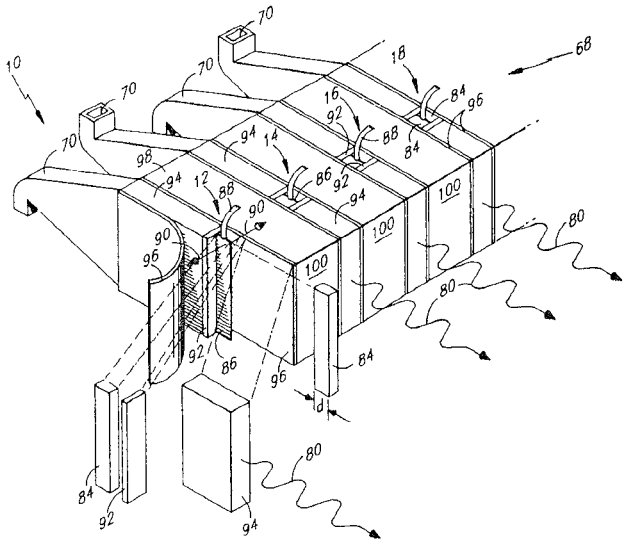
5,309,166 May 3, 1994

Ferroelectric-Scanned Phased Array Antenna

Inventors: Donald C. Collier, Kevin J. Krug, Brittan Kustom.
Assignee: United Technologies Corporation.
Filed: Dec. 13, 1991.

Abstract—A phased array area includes an array of phase shifters, each shifter being operable for shifting the phase of RF energy passing therethrough. Each shifter includes a quantity of ferroelectric material disposed throughout a region. RF energy propagating from a source passes through the material. A thin conductive electrode is disposed in the center of the material, the electrode having a bias voltage imposed thereon. Such voltage creates an electric field across the material, which for a uniaxial ferroelectric orients the optic axis of the material in a direction which is both normal to the direction of propagation of the RF energy and parallel to the polarization direction of the RF energy. The electric field changes the wave propagation constant (i.e., for a uniaxial ferroelectric, the extraordinary wave refractive index, n_e), producing a varying path length of the RF energy in the material, resulting in a controllable alteration of the phase of the RF energy. The varying phase shift produced by each phase shifter controls the antenna's radiating direction.

20 Claims, 3 Drawing Sheets



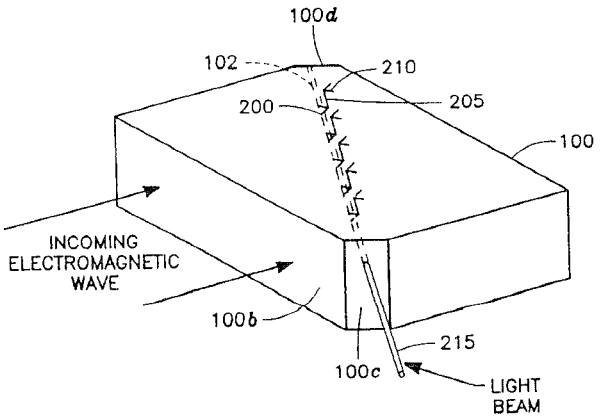
5,309,531 May 3, 1994

Broad-Band Substrate-Wave-Coupled Electro-Optic Modulator

Inventor: Finbar Sheehy.
Assignee: California Institute of Technology.
Filed: Nov. 12, 1992.

Abstract—An electro-optic modulator in which the input electromagnetic signal is launched as a substrate mode in the electrooptic material. Broadband endfire antennas on the top surface of the substrate couple the signal to electrodes positioned above the optical waveguide in the substrate to concentrate the input signal and achieve high electric field strength in the vicinity of the optical waveguide. The endfire antennas are oriented with respect to the optical waveguides so as to compensate for the phase velocity mismatch between the electromagnetic signal and the light beam in the optical waveguide.

21 Claims, 4 Drawing Sheets



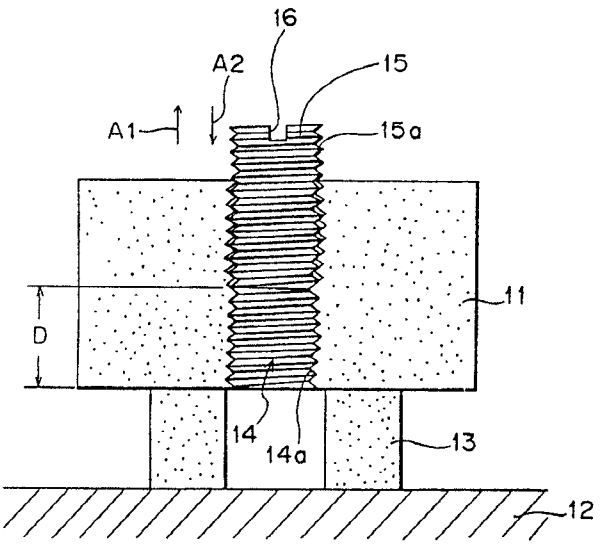
5,311,160 May 10, 1994

Mechanism for Adjusting Resonance Frequency of Dielectric Resonator

Inventor: Yukio Higuchi, Hirotsugu Abe, Shigeyuki Mikami.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Oct. 29, 1992.

Abstract—A mechanism for adjusting the resonance frequency of a dielectric resonator having $TE_{01\delta}$ mode as its operation mode under the presence of the electromagnetic field including: a hole extending along the axis of the dielectric resonator; a tuning bar, made of a dielectric material of a low loss, having a male screw formed on the peripheral surface thereof; and a female screw, to engage the male screw, formed on the wall of the hole. The tuning bar is reciprocated in the hole with the tuning bar engaging the hole so as to adjust the resonance frequency.

8 Claims, 3 Drawing Sheets



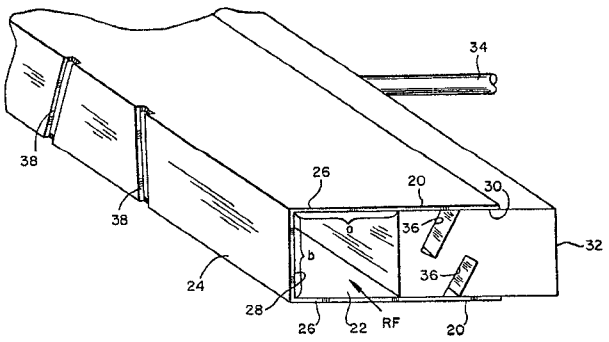
5,311,200 May 10, 1994

Millimeter Wave Variable Width Waveguide Scanner

Inventors: Joel F. Walker, Daniel G. Gonzalez, Gerald E. Pollon.
Assignee: Malibu Research Associates, Inc.
Filed: July 7, 1993.

Abstract—A variable width waveguide scanner includes a pair of spaced apart waveguides defined by U-shaped sleeves each having an open end. A U-shaped plunger having spaced apart parallel first and second arms is coupled to the waveguides such that the arms are received by the open ends of the sleeves and are reciprocatingly slidable in the sleeves. A plurality of radiating elements in the form of spaced apart slots are formed in an end wall of each waveguide.

16 Claims, 6 Drawing Sheets



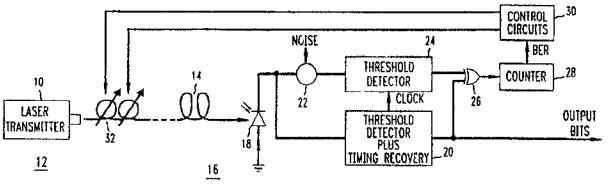
5,311,346 May 10, 1994

Fiber-Optic Transmission Polarization-Dependent Distortion Compensation

Inventors: Zygmunt Haas, Craig D. Poole, Mario A. Santoro, Jack H. Winters.
Assignee: AT&T Bell Laboratories.
Filed: June 17, 1992.

Abstract—The polarization-dependent distortion of an optical signal transmitted through an optical fiber is reduced by aligning the polarization of the optical signal to minimize the received signal distortion. A polarization controller (a device which can change the polarization of light in an optical fiber) may be located at either the input or output end of a long haul optical fiber system and is used to align the polarization of the signal to minimize the received signal distortion. Automatic operation of the polarization controller can be obtained by using a steepest-descent method based on a distortion measure of the received signal for the optical signal transmitted through the optical fiber to generate control signals which are used to control the polarization controller.

14 Claims, 2 Drawing Sheets



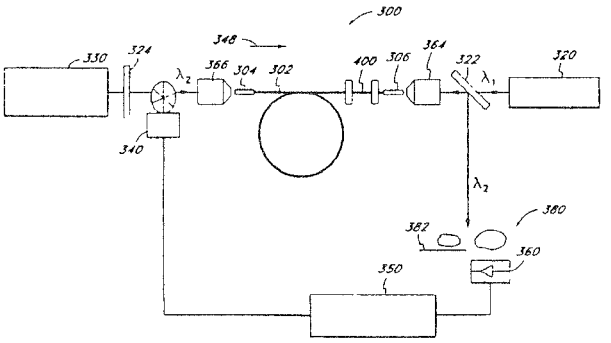
5,311,525 May 10, 1994

Nonlinear Optical Coupler Using a Doped Optical Waveguide

Inventors: Richard H. Pantell, Robert W. Sadowski, Michel J. F. Digonnet, Herbert J. Shaw.
Assignee: The Board of Trustees of the Leland Stanford University.
Filed: Mar. 31, 1992.

Abstract—An optical mode coupling apparatus includes an Erbium-doped optical waveguide in which an optical signal at a signal wavelength propagates in a first spatial propagation mode and a second spatial propagation mode of the waveguide. The optical signal propagating in the waveguide has a beat length. The coupling apparatus includes a pump source of perturbational light signal at a perturbational wavelength that propagates in the waveguide in the first spatial propagation mode. The perturbational signal has a sufficient intensity distribution in the waveguide that it causes a perturbation of the effective refractive index of the first spatial propagation mode of the waveguide in accordance with the optical Kerr effect. The perturbation of the effective refractive index of the first spatial propagation mode of the optical waveguide causes a change in the differential phase delay in the optical signal propagating in the first and second spatial propagation modes. The change in the differential phase delay is detected as a change in the intensity distribution between two lobes of the optical intensity distribution pattern of an output signal. The perturbation light signal can be selectively enabled and disabled to selectively change the intensity distribution in the two lobes of the optical intensity distribution pattern.

56 Claims, 9 Drawing Sheets

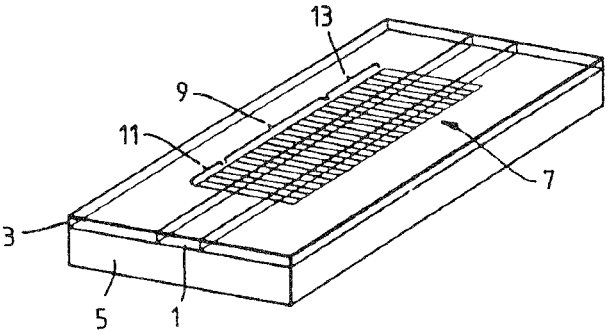


5,311,605 May 10, 1994

Optical Devices Incorporating Slow Wave Structures

Inventor: William J. Stewart.
Assignee: Gec-Marconi Limited
Filed: Dec. 14, 1992.

***Abstract*—An optical device comprising a length of optical waveguide (1) having incorporated therein an extended sequence of coupled single resonator structures (9) so as to form an optical slow wave structure. The sequence of resonator structures is suitably formed by a Bragg diffraction grating pattern (7) extending along the waveguide.**



7 Claims, 2 Drawing Sheets

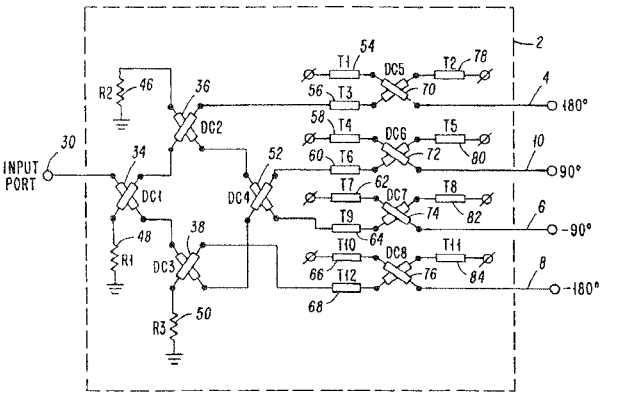
5,313,174 May 17, 1994

2:1 Bandwidth, 4-Way, Combiner/Splitter

Inventor: Richard C. Edwards.
Assignee: Rockwell International Corporation.
Filed: Sept. 18, 1992.

***Abstract*—A four-way 2.1 bandwidth RF splitter/combiner is described. When used as a splitter, the splitter/combiner provides equal amplitude output signals while maintaining quadrature phase over the entire bandwidth of the input signal. This splitter/combiner also maintains a one to one VSWR and eliminates back door intermodulation. When used as a combiner, the splitter/combiner losslessly combines four equal amplitude quadrature phase signals.**

8 Claims, 4 Drawing Sheets



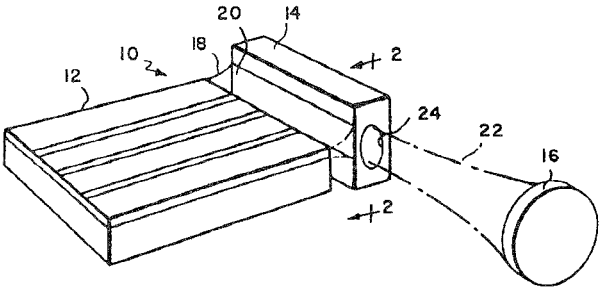
5,313,324 May 17, 1994

Solid State Optical Converter

Inventors: Han Q. Le and William D. Goodhue.
Assignee: Massachusetts Institute of Technology.
Filed: Mar. 27, 1991.

***Abstract*—This invention provides an optical converter suitable for use as the gain medium in lasers, optical amplifiers and other optical devices. The converter consists of at least one and preferable two or more optical converter elements which are sandwiched and separated by inactive dielectric layers. An optical pump beam may be passed to the active converter elements through an antireflection layer at one surface of the converter and a high reflection mirror may be provided at the opposite side of the converter to reflect the pump beam incident thereon back into the converter for a second pass. Each converter element has one or more absorber layers, at least one radiation layer receiving energy from the absorber layers and preferably outputting energy at a slightly different wavelength than the wavelength at which the absorber layers optimally absorb, and preferably at least one index-of-refraction compensator (IRC) layer which compensates for changes in index-of-refraction induced by the absorber and radiator layers to provide a low divergence far field optical intensity profile for the converter with no substantial side lobes.**

19 Claims, 6 Drawing Sheets



5,313,482 May 17, 1994

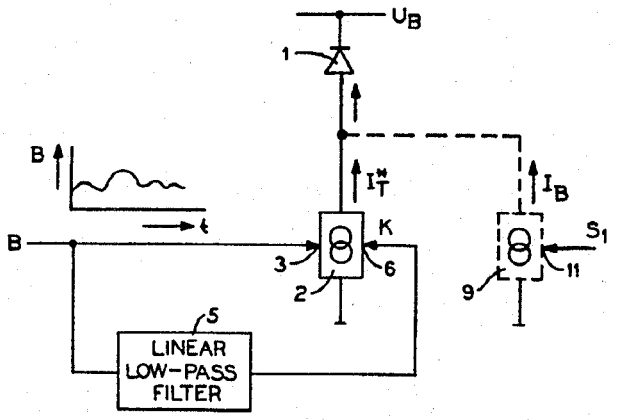
Method and Circuit Arrangement for Correcting the Light Power Output of a Laser Diode

Inventors: Thomas Zelenka, Thomas Jacobsen, Dietrich Asbach.
Assignee: Linotype-Hell AG.
Filed: Aug. 10, 1991.

***Abstract*—The invention concerns a process and circuit for correcting the light-power of a laser diode. The circuit comprises a generator (2) for generating a driver current (I_T) which determines the light-power output of the laser diode. The driver current (I_T) is modulated by a modulation signal (B). To correct the light-power output, the circuit includes a linear low-pass filter (5) which is acted on by the modulation signal (B) and which**

approximately simulates the change with time of the internal temperature of the laser diode (1) as a function of the modulation signal (B). The output signal of the linear low-pass filter (5) acts as a driver current (I_T) correction signal (K), thus compensating for the temperature dependence of the laser-diode light-power output.

13 Claims, 4 Drawing Sheets



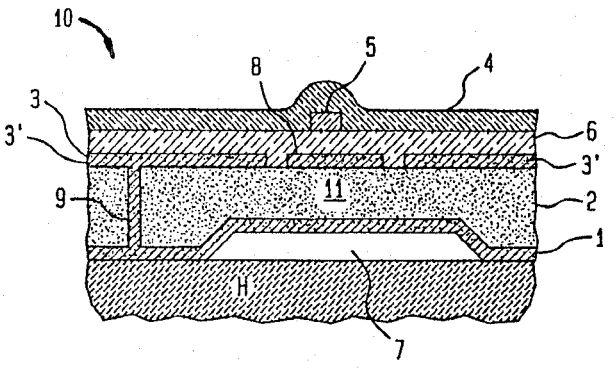
5,313,535 May 17, 1994

Optical Path Length Modulator

Inventor: Gareth F. Williams.
Assignee: Nynex Corporation.
Filed: Feb. 27, 1992.

***Abstract*—An optical integrated circuit comprises an optical substrate and an optical waveguide supported by the substrate. A transducer is incorporated into the optical integrated circuit and coupled to the optical substrate. The transducer comprises a region of piezoelectric material and a set of electrodes for applying a voltage to the piezoelectric material for selectively causing the deformation of the piezoelectric material so as to alter the optical path length of the waveguide.**

22 Claims, 10 Drawing Sheets



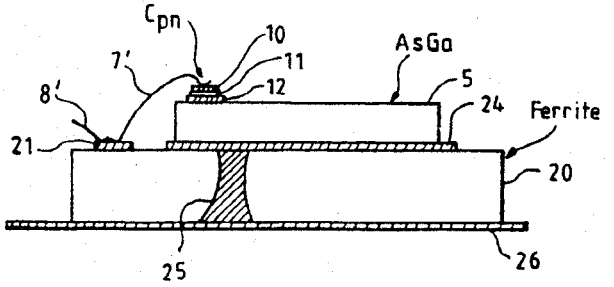
5,313,693 May 24, 1994

Device for the Mounting of Very Wide-Band Microwave Integrated Circuits

Inventor: Gérard Cachier.
Assignee: Thomson-CSF.
Filed: Nov. 3, 1992.

***Abstract*—The integrated circuit chips (5) are mounted on a ferrite support (20). The ferrite support is metallized uniformly (26) on its lower face and bears metallization zones (21, 24) on its other face. To certain of these zones (24) serving as a ground plane, there are attached the integrated circuit chips (5). The other zones (21) act as relays to connect the supply voltages that are applied by means of a linking wire (7′) and a thin film decoupling capacitor (10, 11, 12) borne by the chip. The ground zones (24) are connected to the general ground plane (26) by metallized holes (25). The linking wire (7′) is positioned so as to face a bared part of the ferrite to prevent any parasitic resonance.**

3 Claims, 2 Drawing Sheets



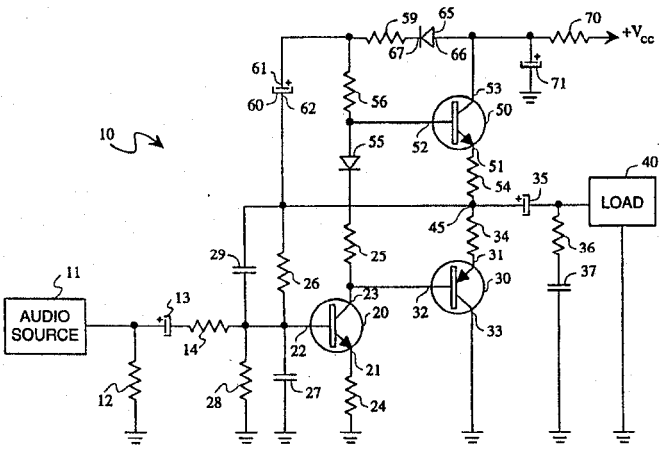
5,315,263 May 24, 1994

Push-Pull Amplifier Having Bootstrap Capacitor Isolation

Inventors: Robert E. Mudra and Mark A. Scholten.
Assignee: Zenith Electronics Corp.
Filed: Dec. 23, 1992.

***Abstract*—An audio power amplifier includes a stacked pair of complementary transistors having the emitters commonly coupled to a load. A driver stage couples the bases of the stacked pair to a source of audio frequency signal. A bootstrap capacitor is coupled between the commonly coupled output node and the supply voltage. An isolation diode is interposed between the bootstrap capacitor and the operating supply to prevent discharge of the bootstrap capacitor into the operating supply during positive signal swings.**

6 Claims, 1 Drawing Sheet



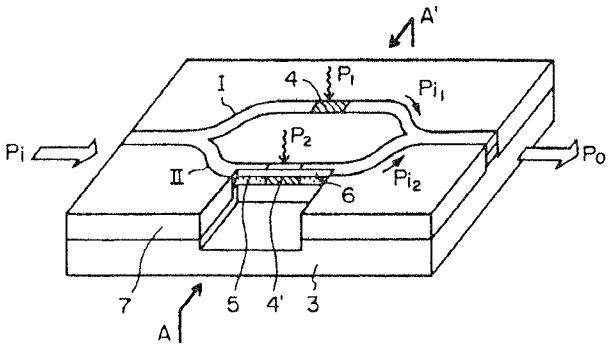
5,315,422 May 24, 1994

Optical Mach-Zehnder Type Logic Element Which performs an Xor Operation

Inventors: Katsuyuki Utaka, Yasuyuki Nagao, Yuichi Matsushima, Kazuo Sakai.
Assignee: Kokusai Denshin Denwa Kabushiki Kaisha.
Filed: Feb. 24, 1993.

Abstract—An optical logic element is disclosed which performs an XOR operation through utilization of the high-speed property of light. On each branched waveguide of a Mach-Zehnder interference type optical waveguide there is provided a phase modulating element whose refractive index undergoes a change when it is irradiated by light. The interference type optical waveguide is adapted to provide different optical output levels when the refractive index changes of the phase modulating elements are both zero or a predetermined value and when they differ from each other. Thus, the optical logic element is capable of performing the XOR or XNOR operation at an ultrahigh speed.

4 Claims, 7 Drawing Sheets



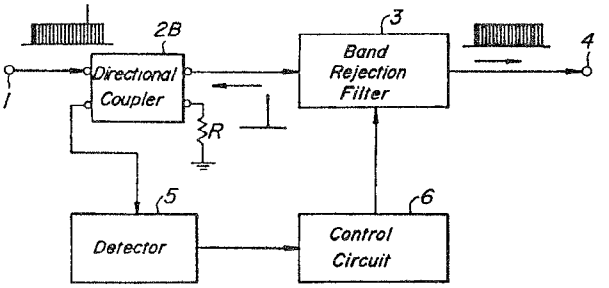
5,317,289 May 31, 1994

Frequency-Fluctuating Interference Removed Receiver

Inventors: Yoshihiro Konishi, Masahito Asa, Hideki Fujiwara.
Assignee: Uniden Corporation.
Filed: Mar. 9, 1993.

Abstract—In order to efficiently and steadily remove a frequency-fluctuating interference wave, for instance, a leakage wave of a household electronic oven, intermixed into a received wave for communication, adaptively to the frequency deviation and the frequency fluctuation of the interference wave, a rejection band component included in the received wave applied onto a circulator an output terminal of which is connected with a variable band rejection filter is reflected from the output terminal on which impedance mismatch is caused by zero-impedance presented by the rejection filter on the basis of absorption of input wave and applied to a detector through the circulator again, in response to a detection output of which a so-called mountaineering control is effected on the variable band rejection filter for shifting the rejection band, so as to maximize the detection output of the detector adaptively to the frequency deviation and the frequency fluctuation of the interference wave.

11 Claims, 3 Drawing Sheets



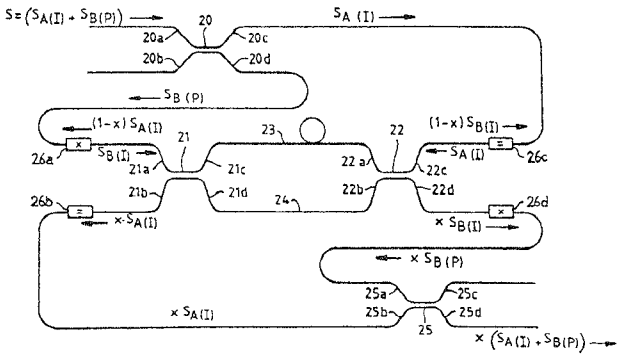
5,317,384 May 31, 1994

Polarization State Insensitive Optical Discriminator

Inventor: Jonathan P. King.
Assignee: Northern Telecom Limited.
Filed: July 17, 1992.

Abstract—A polarization state insensitive optical discriminator is provided by a Mach Zehnder interferometer (21, 22, 23, 24) constructed in polarization preserving optical fibre, and two optical fibre polarization beam splitters (20, 25). Each polarization beam splitter is interconnected with the interferometer in such a way that its two orthogonally polarized outputs are launched to opposite ends of the interferometer with the same state of polarization.

9 Claims, 2 Drawing Sheets



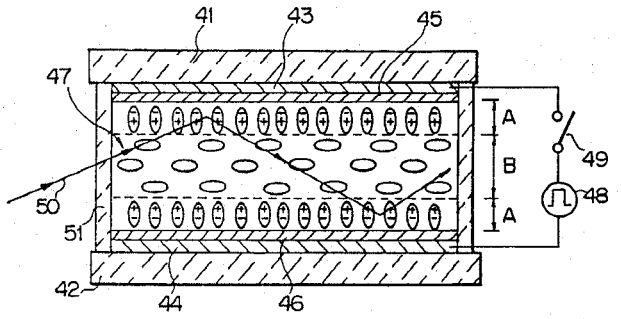
5,317,429 May 31, 1994

Trilayer Nematic Liquid Crystal Optical Switching Device

Inventors: Akihiro Mochizuki and Katsusada Motoyoshi.
Assignee: Fujitsu Limited.
Filed: Nov. 27, 1991.

Abstract—An optical switching device comprising a first layer having a first refractive index and having a first side where a coherent light is to be entered into the first layer and a second side opposite the first side, second and third layers sandwiching the first layer, the second layer having a main surface, and electrodes sandwiching the second and third layers for applying a voltage between the second and third layers, wherein a refractive index of he second layer can be changed from second to third and from third to second refractive indexes by an electro-optical effect using the voltage, the second refractive index being larger than the third refractive index, wherein the coherent light entering the first layer is totally reflected by the second layer when the second layer has the second refractive index, and at least part of the coherent light is transmitted through the second layer toward the outside of the main surface of the second layer when the second layer has the third refractive index.

10 Claims, 6 Drawing Sheets



5,317,575 May 31, 1994

System for Determining Birefringent Axes in Polarization-Maintaining Optical Fiber

Inventor: John B. Aniano.
Assignee: Allied Signal Inc.
Filed: Dec. 11, 1992.

Abstract—To determine the angular orientation of polarization axes within a length of polarization-maintaining optical fiber, a coherent light source, such as a laser, is focused onto the side of the polarization-maintaining optical fiber and a resultant scattered pattern is generated. A sensor/analyzer monitors the resultant scattered pattern and determines the location of the polarization axes.

5 Claims, 2 Drawing Sheets