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.

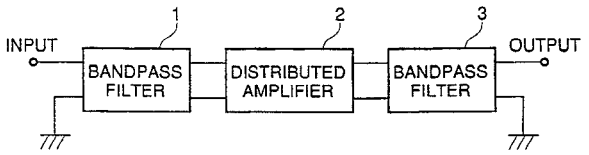
5,412,339 May 2, 1995

High-Frequency Amplifier

Inventor: Isamu Takano.
Assignee: NEC Corporation.
Filed: June 13, 1994.

***Abstract*—**A high-frequency amplifier has a distributed amplifier having a sufficiently wide band and formed on a microwave-integrated circuit, and at least one bandpass filter directly connected to the distributed amplifier and formed of a microstrip line having a desired frequency band with a desired center frequency.

19 Claims, 7 Drawing Sheets



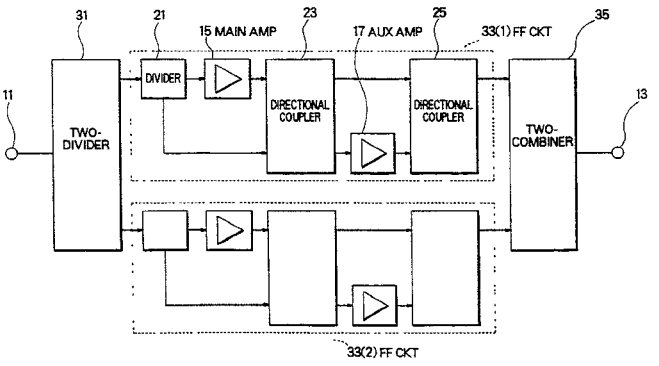
5,412,342 May 2, 1995

Power Amplifier Device Comprising a Plurality of Feedforward Distortion Compensating Circuits in Parallel

Inventors: Hironori Sakamoto, Akira Ito, and Toshio Nojima.
Assignees: Japan Radio Co., Ltd., Nippon Telephone & Telephone Corporation, NTT Mobile Communication Network Inc.
Filed: Jan. 14, 1993.

***Abstract*—**For supply to first and second feedforward distortion-compensating circuits **33(1)** and **33(2)**, connected in parallel, a two-divider **31** divides into signals of a common phase and a common amplitude an input or composite radio frequency signal supplied to an input terminal **11**. The composite radio frequency signal collectively has a plurality of radio frequency signals of different frequencies. A two-combiner **35** combines component outputs of the feedforward circuits in inphase as an amplified output signal, which is supplied to an output terminal **13**. In general, N feedforward circuits (N being an integer not less than two) are connected in parallel and are supplied with the input radio frequency signal through an N-divider. Component outputs of the feedforward circuits are combined in inphase as the output signal by an N-combiner. Alternatively, the input radio frequency signal is divided into signals of a predetermined phase difference and of a common amplitude by the N-divider. In this case, the component outputs of the feedforward circuits are combined in a phase of cancelling the predetermined phase difference by the N-combiner.

4 Claims, 7 Drawing Sheets



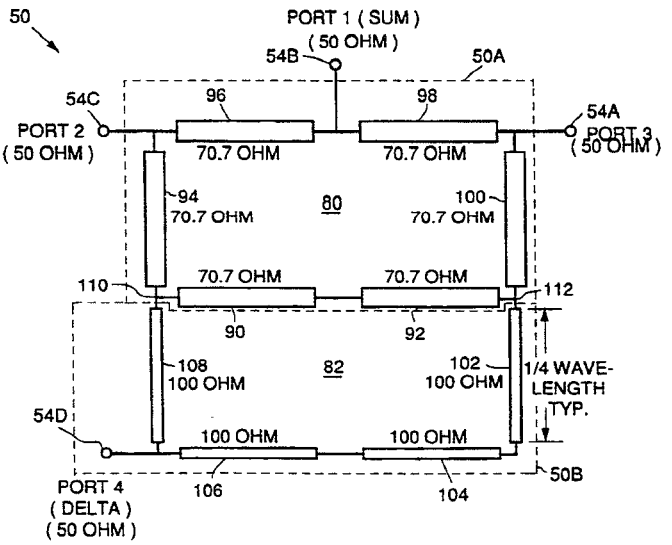
5,412,354 May 2, 1995

Single-Layer Double Ring Hybrid Magic-Tee

Inventor: Clifton Quan.
Assignee: Hughes Aircraft Company.
Filed: June 2, 1994.

***Abstract*—**A magic-tee hybrid network fabricated as a single conductor layer circuit. The network is fabricated from two ring sections, connected together to provide four magic-tee ports, i.e., sum, difference, and two input/output ports. The double ring network with single-layer construction provides wide bandwidth at a low fabrication cost.

12 Claims, 2 Drawing Sheets



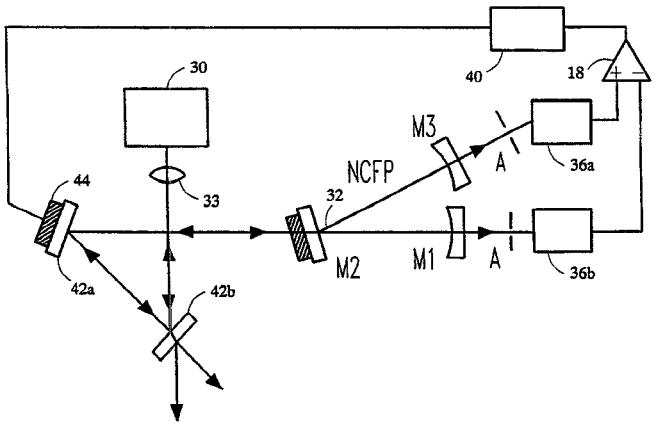
5,412,676 May 2, 1995

Method and Apparatus for the Determination of the Relative Frequency Offset Between an Input Optical Signal and a Resonance Frequency of an Optical Cavity

Inventors: Dietmar Schnier, Alan A. Madej, and Gary R. Hanes.
Assignee: National Research Council of Canada.
Filed: June 6, 1994.

Abstract—A method and apparatus for stabilizing the relative frequency offset between a laser and a resonant optical cavity is described. Detected spatial mode patterns excited in a coupled, nearly confocal resonator are used to derive a correction signal for frequency offset. The method can be applied to stabilizing a diode-cavity pathlength for an optical feedback locked diode laser system.

8 Claims, 7 Drawing Sheets



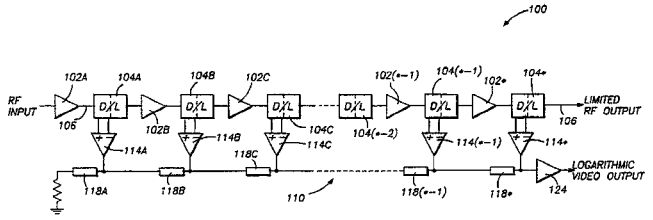
5,414,313 May 9, 1995

Dual-Mode Logarithmic Amplifier Having Cascaded Stages

Inventors: Emil J. Crescenzi, Jr., Jonathan K. Bamford, Titus J. Wandinger, and Michael A. O'Mahoney.
Assignee: Watkins Johnson Company.
Filed: Feb. 10, 1993.

Abstract—A dual-mode successive detection amplifier for providing a first output signal corresponding to a logarithmic function of a RF input signal and a second limited RF output signal is disclosed herein. A RF input signal is applied to the first of a succession of amplification stages arranged along a RF signal path to cascade amplify the RF input signal into the limited RF output signal. A plurality of detector/limiter (D/L) circuits interposed between the amplification stages limit RF signal energy propagating along the RF signal path so as to prevent saturation of the amplification stages. The D/L modules also provide a succession of detection signals corresponding to video envelopes of the RF signal energy produced by each of the amplification stages. The detection signals are applied to a video summation line and therein added to produce the logarithmic output signal.

18 Claims, 7 Drawing Sheets



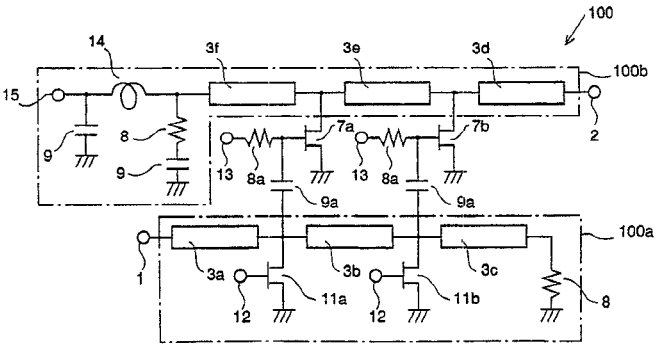
5,414,387 May 9, 1995

Distributed Amplifier and Bidirectional Amplifier

Inventors: Kazuhiko Nakahara and Yoshinobu Sasaki.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: June 13, 1994.

Abstract—A distributed amplifier includes an input side circuit including a plurality of distributed constant lines connected in series between an input terminal and ground and a plurality of source-grounded FET's for switching operation having drains connected to respective junctions of the distributed constant lines, an output side circuit including a plurality of distributed constant lines connected in series between an output terminal and ground, and a plurality of source-grounded amplifier FET's having gates connected to respective junctions of the distributed constant lines of the input side circuit via capacitors and drains connected to junctions of the distributed constant lines of the output side circuit. In this structure, since the input side circuit also serves as a distributed switch, when a T/R module is fabricated using the distributed amplifier, it is not necessary to add a distributed switch for controlling signal input and output, so that the chip size of the T/R module is reduced compared to the conventional T/R module. In addition, the signal transmission loss is reduced.

12 Claims, 7 Drawing Sheets



5,414,412 May 9, 1995

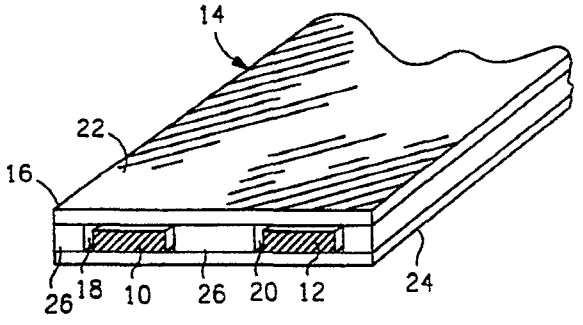
Frequency Dividing Transponder, Including Amorphous Magnetic Alloy, and Tripole strip of Magnetic Material

Inventor: Ming R. Lian.
Assignee: Security Tag Systems, Inc.
Filed: June 16, 1993.

Abstract—In an electronic article surveillance (EAS) system, a frequency-dividing transponder that responds to detection of electromagnetic radiation of a first predetermined frequency by transmitting electromagnetic radiation of a second predetermined frequency that is a frequency-divided quotient of the first predetermined frequency includes an active strip of amorphous magnetic material having a transverse uniaxial anisotropy defining a magnetomechanical resonant frequency in accordance with the dimensions of the strip at the second predetermined frequency when magnetically biased to be within a predetermined magnetic field intensity range, so as to respond to excitation by electromagnetic radiation of the first predetermined frequency by transmitting electromagnetic radiation of the second predetermined frequency. Also included is a tripole strip of magnetic material of such coercivity and so disposed in relation to the active strip of magnetic material as to create a magnetomechanical resonance in the active strip at the first predetermined frequency when the active strip is magnetically biased to be within the predetermined magnetic field intensity range. The transponder may also include a bipolar bias strip of such coercivity and so disposed in relation

to the active strip as to cause the active strip to be within the predetermined magnetic field intensity range at which the active strip has magnetomechanical resonance at the first and second predetermined frequencies.

11 Claims, 2 Drawing Sheets



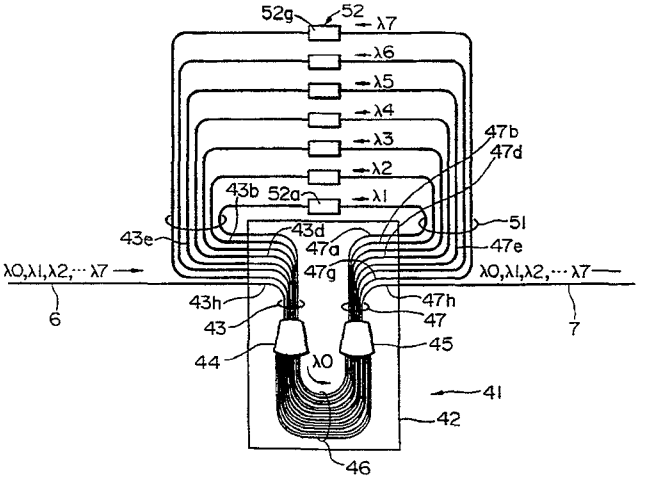
5,414,548 May 9, 1995

Arrayed-Wave Guide Grating Multi/Demultiplexer with Loop-Back Optical Paths

Inventors: Yoshiaki Tachikawa, Masao Kawachi, Hiroshi Takahashi, and Kyo Inoue.
Assignee: Nippon Telegraph and Telephone Corporation.
Filed: Sept. 28, 1993.

Abstract—An optical device is presented that is useful for optical signal transmission and switching systems by multiplexing and demultiplexing optical signals in looped optical paths, consisting of a plurality of individual loop-back optical paths. The device is essentially a multi/demultiplexer having an arrayed waveguide grating disposed between a plurality of input sections and output sections, which are joined by the plurality of individual loop-back optical paths. Because the modulated signals are looped back into the same optical paths using the same devices, problems of mismatching performance introduced by using different optical devices are avoided. The device processes individual optical signals of different wavelenths, minimizes splitting losses, and reduces noise components by producing narrow bandpass signals of high signal to noise ratio. Optical signal splitting and insertion, delay line memory, and delay equalization circuits can all be handled by the same circuit configuration. The device is simple in construction, reliable in performance, and economical in production

33 Claims, 17 Drawing Sheets



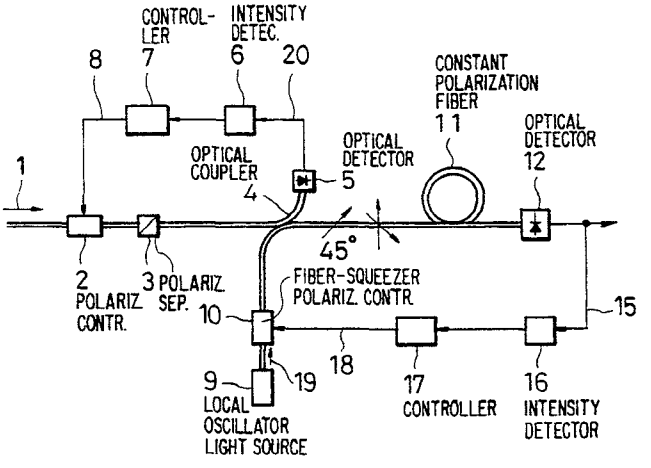
5,414,550 May 9, 1995

Optical Heterodyne Detector and Receiver

Inventor: Takashi Ono.
Assignee: NEC Corporation.
Filed: Apr. 27, 1993.

Abstract—An optical heterodyne detector and receiver rejects an image signal stably regardless of disturbance. Signal light is passed through a first polarization controller and a polarization separator for conversion into linearly polarized light. The signal light and locally oscillated light that has passed through a second polarization controller are coupled with each other by an optical coupler. Light emitted from a first output port of the optical coupler is received to produce a first beat signal. Light emitted from a second output port of the optical coupler is applied to a polarization-maintaining fiber whose own axis is included 45° to the polarization of the signal light. Light emitted from the polarization maintaining fiber is received to produce a second beat signal. The first polarization controller is operated to control the polarization of the signal light for maximizing the first beat signal at all times. The second polarization controller is operated to control the polarization of the locally oscillated light for maximizing the second beat signal at all times.

3 Claims, 5 Drawing Sheets



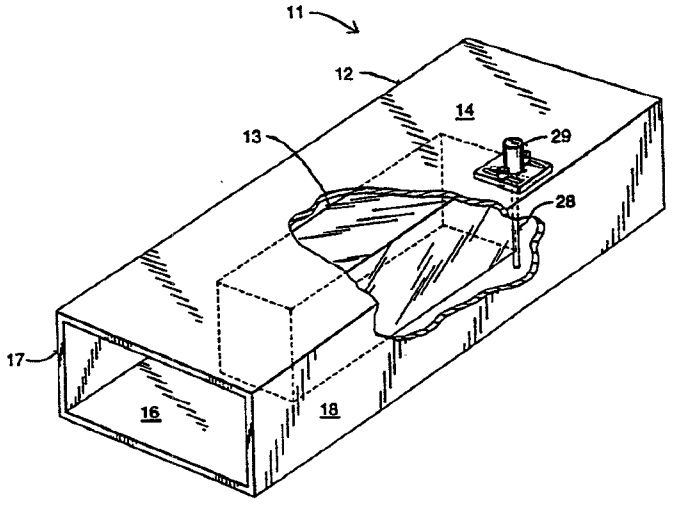
5,414,552 May 9, 1995

Partially Loaded Microwave Waveguide Resonant Standing Wave Electrooptic Modulator

Inventor: Asif A. Godil.
Assignee: The Board of Trustees of the Leland Stanford, Jr. University.
Filed: Dec. 27, 1993.

Abstract—An elegant design for an optical modulator having a high Q is described. The modulator is made up of a straightforward microwave guide within which a block of a monocrystalline electrooptic material such as lithium niobate is positioned. The modulator is dimensioned to support sequentially standing waves of modulating energy within the desired bandwidth. Optical radiation to be modulated is introduced into the crystal. In one embodiment designed particularly for the 2–15 GHz range, the amount of crystalline material necessary to interact with the incoming radiation is selected to be a minimum, and in another embodiment designed for the 15–75 GHz frequency range a zig-zag reflection pattern is provided within the crystal.

3 Claims, 3 Drawing Sheets



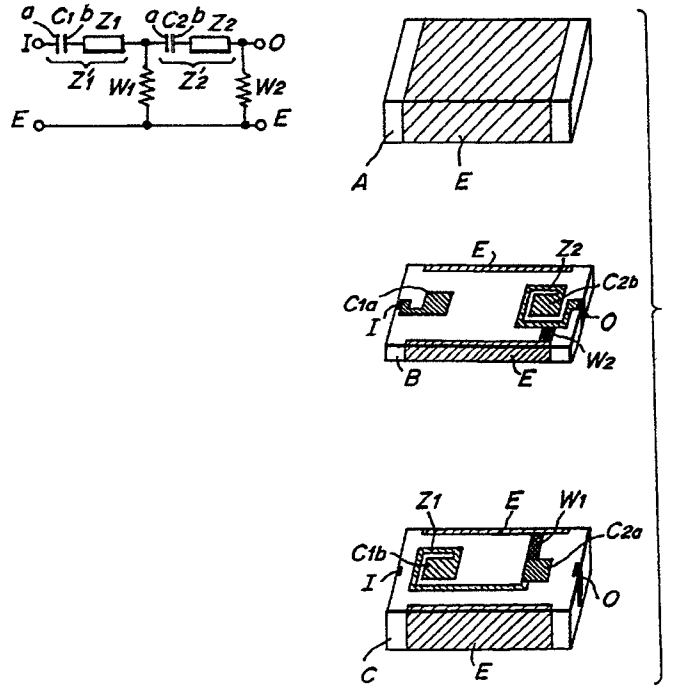
5,416,450 May 16, 1995

Ferrite-Loaded Constant Impedance Element and a Constant Phase Circuit Using it in an Ultra-Wide Frequency Range

Inventor: Yoshihiro Konishi.
Assignee: Uniden Corporation.
Filed: Sept. 14, 1993.

Abstract—To realize an element presenting a constant impedance throughout an extremely wide frequency range and a circuit supplying a high-frequency signal having a constant phase throughout the same wide frequency range, a ferrite-loaded line element, a real part of a terminal complex impedance of which is substantially constant, is provided. A partial inclination of an imaginary part of the terminal complex impedance is compensated by providing a pure reactance element, in combination therewith. As a result, in an extremely wide frequency range exceeding a natural magnetical resonant frequency, a ferrite-loaded constant impedance element and a constant phase circuit comprising this constant impedance element can be attained.

14 Claims, 10 Drawing Sheets



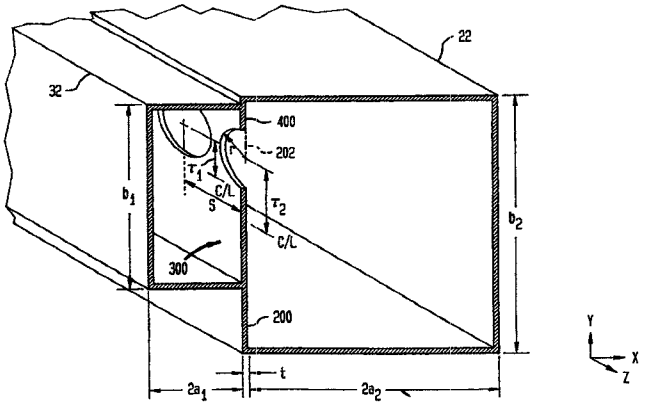
5,416,452 May 16, 1995

Mode Diversity Coupler for Vertical Polarization

Inventors: Anthony R. Noerpel and Adedokun W. Sule-Koiki.
Assignee: Bell Communications Research, Inc.
Filed: Mar. 9, 1993.

Abstract—A mode coupler for vertically polarized modes comprises a first waveguide (**32**) having a relatively small rectangular cross section and a second waveguide (**22**) having a relatively large rectangular cross section. The first small cross-section waveguide has a wall (**300**) formed in common with a portion (**400**) of a wall (**200**) of the second large cross-section waveguide. The common wall portion contains a series of circular apertures (**202**) extending in a longitudinal direction of both waveguides. The centers of the apertures are displaced a first distance (τ_1) from a center line of a wall of the first waveguide and a second distance (τ_2) from a center line of the wall of the second waveguide. In this case, a fundamental TE_{01S} mode of the first waveguide is in phase synchronism and couples equally to the two degenerate TE_{11L} and TM_{11L} higher-order vertically polarized modes of the second waveguide.

7 Claims, 2 Drawing Sheets



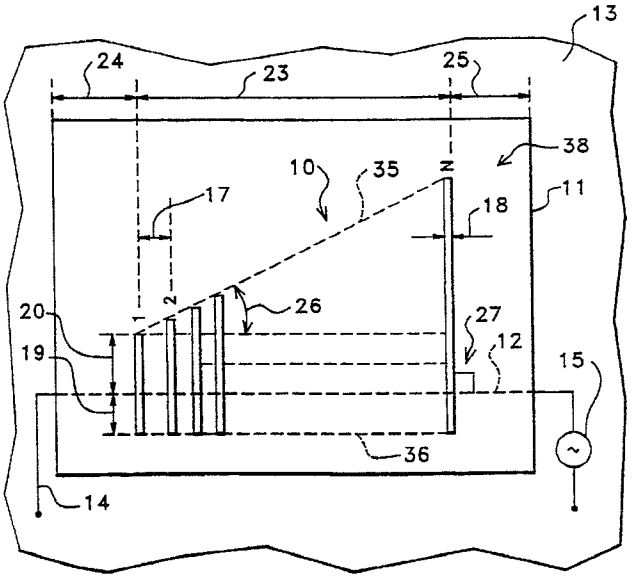
5,416,490 May 16, 1995

Broadband Quasi-Microstrip Antenna

Inventor: Zorana B. Popovic.
Assignee: The Regents of the University of Colorado.
Filed: July 16, 1993.

Abstract—Described is a generally planar antenna having a tapered array of radiating/receiving elements that are transversely mounted in capacitive coupling to an elongated transmission line that underlies the array. The shorter dipole elements resonate at high frequencies, the longer dipole elements resonate at lower frequencies, and the intermediate length dipole elements resonate at intermediate frequencies. The dipole elements are mounted on one surface of a planar dielectric substrate to form a planar generally triangular-shaped pattern having relatively narrow spacing between individual dipole elements (for example, on-twentieth of the wavelength of the intermediate frequencies), and having a relatively large spacing to width ratio. Coupling between the dipole elements causes them to operate as if they were a single broadband dipole element.

12 Claims, 1 Drawing Sheet



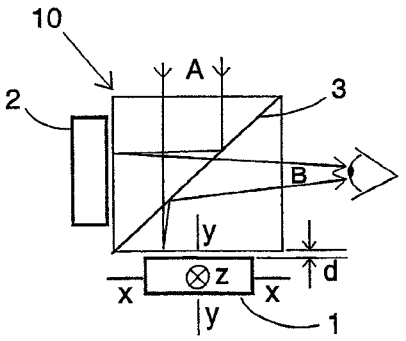
5,416,618 May 16, 1995

Full Complex Modulation Using Two On-Parameter Spatial Light Modulators

Inventor: Richard D. Juday.
Assignee: The United States of America as represented by the Administrator of the National Aeronautics & Space Administration.
Filed: Nov. 10, 1992.

Abstract—Full complex spatial light modulation is enabled by an optically additive combination of the actions of separate and independent spatial light modulators, even though the independent modulators can each express only a one-parameter subset of complex values called its operating curve. Similarly the operating curve of a single modulator can be shifted (biased) by optically adding a constant complex value.

24 Claims, 13 Drawing Sheets



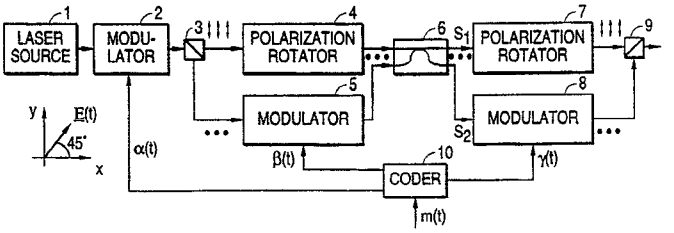
5,416,628 May 16, 1995

Multilevel Coherent Optical System

Inventors: Silvello Betti, Franco Curti, Giancarlo De Marchis, and Eugenio Iannone.
Assignee: Fondazione Ugo Bordoni.
Filed: May 6, 1991.

Abstract—A multilevel coherent optical system, including a heterodyne transmitter and receiver in which a multilevel signal with a coherent optical carrier is provided by modulating the phase and the polarization of the electromagnetic field propagating through a single-mode optical fiber. The transmitter comprises a coherent light source providing the optical carrier, a phase modulator modulating the phase of the carrier, a polarization modulator, and a modulation signal generator providing control signals to the phase modulator and the polarization modulator. The receiver comprises a first stage carrying out the heterodyne detection of the phase component and the phase quadrature component of the polarization of the signal received through an optical fiber, a second stage demodulating the received signal to provide the multilevel signal, and a processing circuit comparing the received multilevel signal with predetermined reference signals. Such a system exploits the four degrees of freedom of the electromagnetic field propagating through the optical fiber so as to more closely approach the theoretical Shannon limit compared with conventional systems.

8 Claims, 4 Drawing Sheets



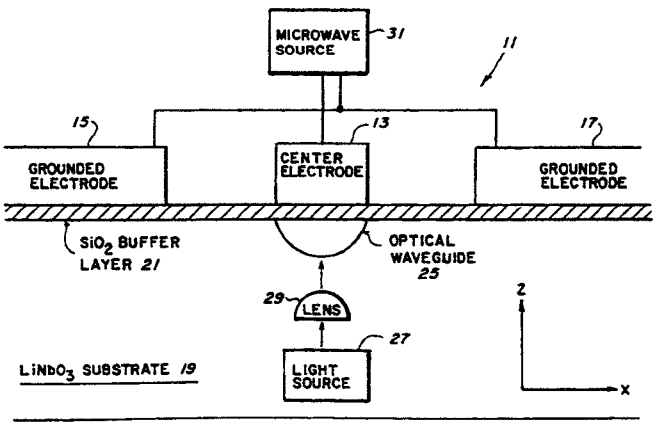
5,416,859 May 16, 1995

Broadband, Low-Drive Voltage, Electrooptic, Integrated Optical Modulator

Inventors: William R. Burns, Catherine H. Bulmer, and Ganesh K. Gopalakrishnan.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: Apr. 14, 1993.

Abstract—A broadband, electrooptic modulator is disclosed that in a first embodiment comprises: a substrate having substrate modes, having electrooptic effects, and having a first optical waveguide adapted to receive and transmit light therethrough in a first direction and with a first phase velocity; a buffer layer disposed on the substrate; and a coplanar waveguide electrode structure having a coplanar mode and being disposed on the buffer layer for receiving an electrical signal propagating therethrough in the first direction with a second phase velocity to phase modulate the light in the optical waveguide at a frequency in the range from 0 Hz up to substantially 40 GHz. The substrate has a sufficiently small thickness so that coupling between the coplanar mode of the coplanar waveguide electrode structure and any one of the substrate modes of the substrate substantially does not occur over a desired frequency bandwidth of operation, and the coplanar waveguide electrode structure has a sufficiently large thickness so that the second phase velocity of the electrical signal is substantially equal to the first phase velocity. In a second embodiment of the invention an intensity modulator is produced by adding a second optical waveguide, which, in combination with the first optical waveguide, forms an inteferometer.

27 Claims, 9 Drawing Sheets



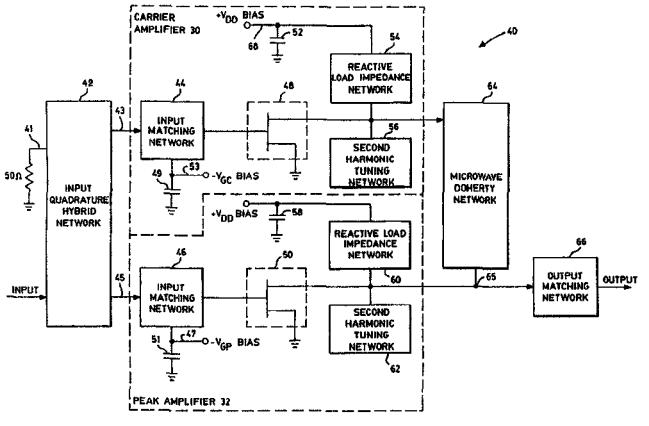
5,420,541 May 30, 1995

Microwave Doherty Amplifier

Inventors: David M. Upton and Robert J. McMorrow.
Assignee: Raytheon Company.
Filed: June 4, 1993.

Abstract—An improved Doherty amplifier for operation at microwave frequencies using microstrip circuit technology and gallium arsenide devices to achieve greater efficiency and linearity. The circuit divides the input power equally between a carrier amplifier and peak amplifier with a quarter-wave delay at the input to the peak amplifier, insuring that the output power of the two amplifiers will be in phase at the load. A three-port network combines the phase-delayed carrier amplifier output with the output of the peak amplifier. The outputs of the two amplifiers are connected together by a quarter wave transmission line of impedance R. A load of one-half the optimum load (R/2) is attached to the output of the peak amplifier. A quarter-wave line section provides the transition from R/2 to the desired impedance, R. When the peak amplifier is off, its output impedance is infinite and the output power of the carrier amplifier is delivered entirely to the load. As the peak amplifier becomes more active, it delivers more of its output power to the load while its output current gradually reduces the effective load impedance seen by the carrier amplifier, thus allowing it to deliver more power. In this way the microwave Doherty amplifier allows 6 dB of linear power amplification beyond the point where a normal Class "B" amplifier begins to saturate and the microwave amplifier efficiency remains close to the maximum attainable linear efficiency.

64 Claims, 9 Drawing Sheets



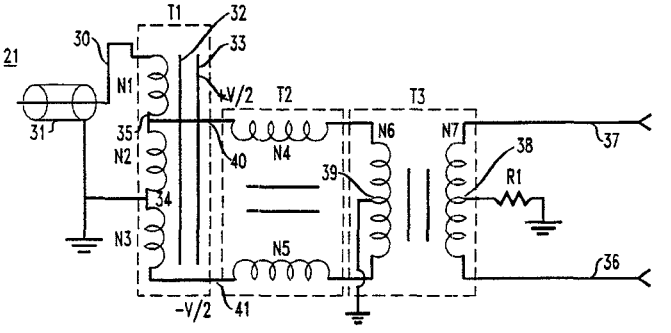
5,420,551 May 30, 1995

Circuit for Broadband Video Transmission Over Unshielded Twisted Wire Pairs

Inventors: Robert A. Conte and William H. Georger.
Assignee: AT&T Corp.
Filed: June 29, 1994.

Abstract—Disclosed is a circuit that permits transmission of broadband analog CATV video signals on unshielded twisted wire pairs. The circuit includes an autotransformer with a ground connection coupled to the node between two secondary windings. The two opposite ends of the secondary windings are coupled to a choke, which in turn is coupled to an isolation transformer with a center-tapped primary and secondary winding for shunting any remaining common-mode currents.

4 Claims, 1 Drawing Sheets



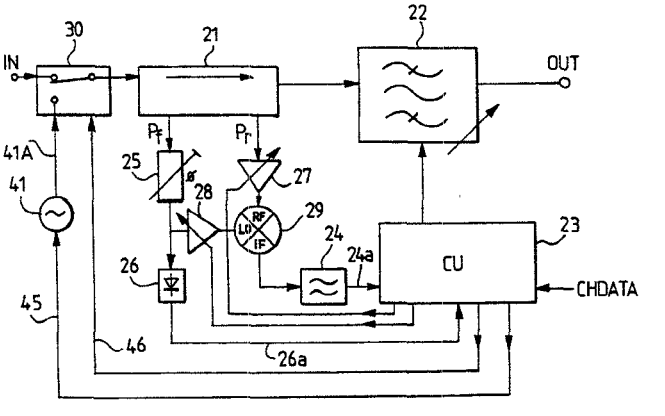
5,420,552 May 30, 1995

Device and Method for Adjusting a Bandpass Filter, Especially a Combiner Filter

Inventor: Veli-Matti Säkkä.
Assignee: Nokia Telecommunications Oy.
Filed: May 8, 1992.

Abstract—A frequency adjustment method for an RF bandpass filter, especially a combiner filter, wherein the center frequency of the passband of the RF bandpass filter is adjusted in response to the RF power reflected from the input of the bandpass filter or passed through the bandpass filter. A sample signal proportional to the RF power reflected from the input of the bandpass filter or passed through the bandpass filter is mixed with a signal of substantially the transmitting frequency. The mixing result is lowpass-filtered and the bandpass filter is adjusted in response to the lowpass-filtered mixing result.

16 Claims, 2 Drawing Sheets



5,420,595 May 30, 1995

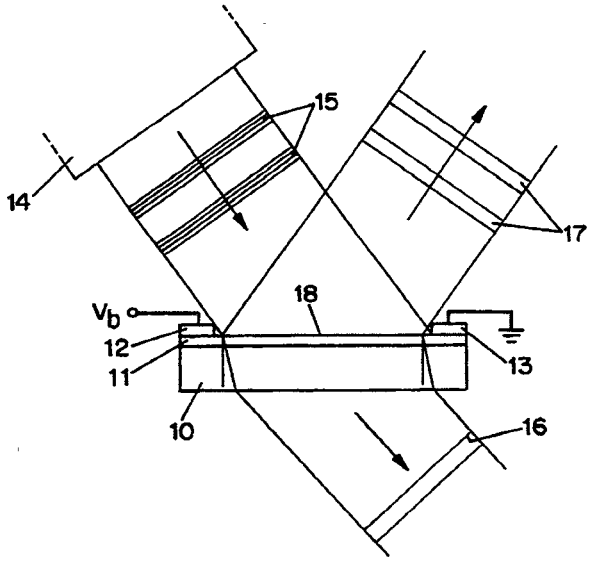
Microwave Radiation Source

Inventors: Xi-Cheng Zhang and David H. Auston.
Assignee: Columbia University in the City of New York.
Filed: Oct. 28, 1993.

Abstract—A source of collimated beam or beams of microwave electromagnetic radiation pulses comprises a photoconductor substrate having a

major surface and an optical radiation source providing a beam of optical radiation pulses for illuminating at least a relatively large aperture region of the major surface. A static electric field, intrinsic or applied, is present at the major surface for driving transient photocurrents generated by the beam of optical radiation pulses. Each beam of microwave electromagnetic radiation pulses emitted from the photoconductor substrate may be steered by varying the angle of incidence of the beam of optical radiation pulses illuminating the major surface by varying the period of the spatial variation of a static electric field applied to the major surface by means of electrodes, or by varying the period or direction of a periodic intensity variation of a spatially modulated beam of optical radiation pulses on the major surface.

36 Claims, 5 Drawing Sheets



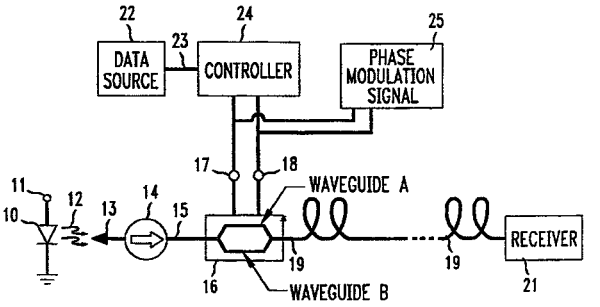
5,420,868 May 30, 1995

Suppression of Brillouin Scattering in Lightwave Transmission System

Inventors: Andrew R. Chraplyvy, Xiaoping Mao, and Robert W. Tkach.
Assignee: AT&T Corp.
Filed: Oct. 20, 1994.

Abstract—Optical nonlinear effects, such as stimulated (Brillouin) scattering, cause disproportionate attenuation of transmitted optical signals and usually occurs only when the optical power exceeds a certain level. One of the most important types of nonlinear scattering, which occurs in an optical fiber as the power of the optical signal is increased above a certain level, is stimulated Brillouin scattering. Brillouin scattering limits the power density of an optical signal that can be injected into an optical fiber. This invention suppresses Brillouin scattering and, by so doing, permits the power density of the optical signal, which is injected into an optical fiber to be increased approximately threefold before the Brillouin scattering threshold is reached. More specifically, in a lightwave AM-VSB CATV transmission system having an external modulator, the optical beam, which is amplitude modulated with the CATV signals, is also phase modulated with a sinusoidal signal having a frequency that is not less than twice the frequency of the highest CATV signal. The phase modulation of the optical beam suppress Brillouin scattering. With this invention the power density of the CATV signal can be increased approximately three fold before the threshold of Brillouin scattering is reached.

16 Claims, 5 Drawing Sheets



5,420,948 May 30, 1995

Chirped Optical Fiber Filter

Inventor: Kevin C. Byron.
Assignee: Northern Telecom Limited.
Filed: Aug. 12, 1994.

Abstract—A chirped distributed Bragg grating optical fiber filter comprises an adiabatically tapered single-mode optical fiber provided on the taper with a distributed Bragg grating of uniform pitch.

1 Claim, 2 Drawing Sheets