Patent Abstracts

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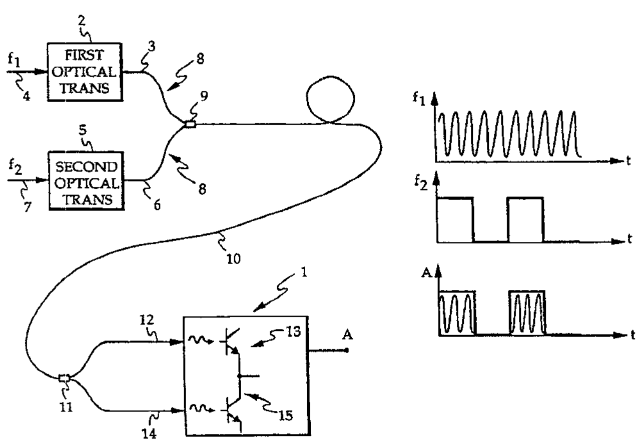
5,473,286 Dec. 5, 1995

Microwave Generator Circuit Having Oscillator and Controller Responsive to Separate Wavelengths

Inventor: Rolf Heidemann.
Assignee: Alcatel N.V.
Filed: Feb. 18, 1994.

Abstract—A microwave generator has its microwave frequency optically phase-locked by means of a reference frequency of a reference signal, wherein at least one portion of an electronic circuit arrangement is supplied with an optical reference carrier signal modulated with the reference frequency. The circuit arrangement (**16**) includes two components (Q1 to Q**6**; Q**10**, Q**11**) based on different semiconductor types, which are chosen so that one of them, the first component, which is of a first semiconductor type, optically responds to the reference carrier signal (**3**) and, thus, to the reference frequency (f_1 mod1 ... Modn) for achieving synchronization, and that—independently of the response of the first component—the other, second component, which is of a second semiconductor type, responds to an optical control carrier signal (**6**) differing in frequency from the reference carrier signal (**3**). The amplitude of the first component is controlled by means of a control signal (**7**) modulated onto the optical control carrier signal (**6**).

15 Claims, 5 Drawing Sheets



Publisher Item Identifier S 1051-8207(96)09410-X.

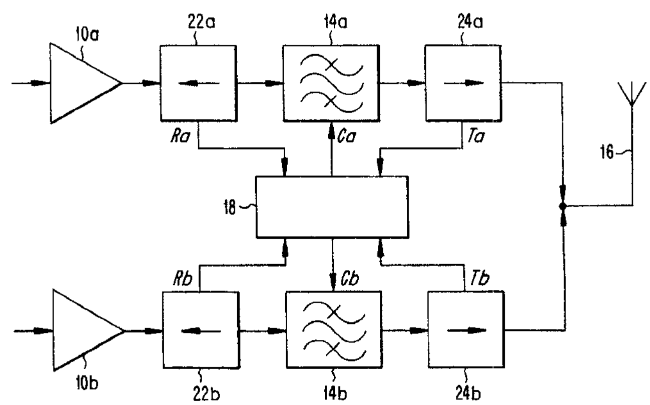
5,473,292 Dec. 5, 1995

Method for Fine Tuning the Resonant Frequency of a Filter in a Combiner

Inventor: John A. Victorin.
Assignee: Telefonaktiebolaget LM Ericsson.
Filed: Feb. 4, 1994.

Abstract—The invention relates to a method for fine tuning the resonant frequency of a filter in a combiner, which is provided for combining signals from several radio channels, to the carrier frequency of an input signal to the filter. The power of the output signal from the filter is measured in a narrow frequency band around the carrier frequency of said input signal. Furthermore, the power of the signal reflected by the filter is measured in a narrow frequency band around the carrier frequency of the input signal. Thereafter a measure of the ratio between the two power measurements is formed. The resonant frequency of the filter is adjusted so as to maximize this measure.

10 Claims, 3 Drawing Sheets



5,473,294 Dec. 5, 1995

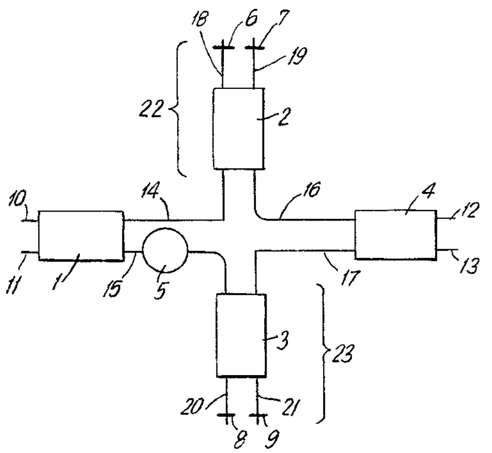
Planar Variable Power Divider

Inventors: Roberto Mizzoni and Rodolfo Ravanelli.
Assignee: Alenia Spazio S.P.A.
Filed: Mar. 6, 1995.

Abstract—A novel planar variable power divider, using waveguide technology, includes two hybrids and two variable phase shifters. The variable power divider includes a variable phase shifter based on a 3-dB hybrid circuit terminated by two sliding noncontacting moveable short circuits. The

differential phase spreading of the phase shifter has been reduced to less than one-sixth of typical transmission line dispersion by the compensating short terminations. As a consequence, electrical performance achievable over a 16% bandwidth is significantly improved with respect to heretofore-known variable power dividers. The variable power divider also provides for planar integration, wideband performance, medium-high power handling capabilities, and low loss.

20 Claims, 3 Drawing Sheets



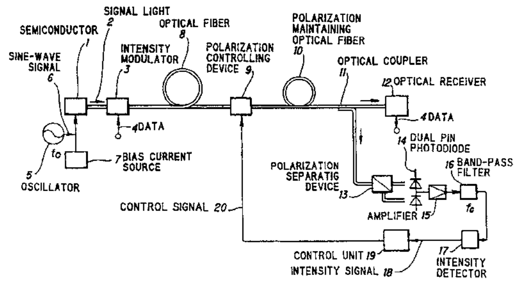
5,473,457 Dec. 5, 1995

Method and Apparatus for Compensating Dispersion of Polarization

Inventor: Takashi Ono.
Assignee: NEC Corporation.
Filed: Dec. 16, 1994.

Abstract—A signal light that is frequency-modulated by a predetermined frequency is supplied to an optical fiber. The signal light supplied from an output end of the optical fiber is supplied to a polarization controller, from which the signal light is supplied to a polarization maintaining optical fiber. An output signal light of the polarization-maintaining optical fiber is supplied to a polarization separating device, in which two orthogonal polarizations are obtained. Signal lights of the two orthogonal polarizations are received by a balanced photodetector, in which an electric signal is generated. In the electric signal, an intensity of the predetermined frequency component is detected. Then, the polarization controller is controlled to constantly minimize the intensity, so that the polarization dispersion in a transmission line is compensated to suppress the deterioration of wave-shape.

4 Claims, 3 Drawing Sheets



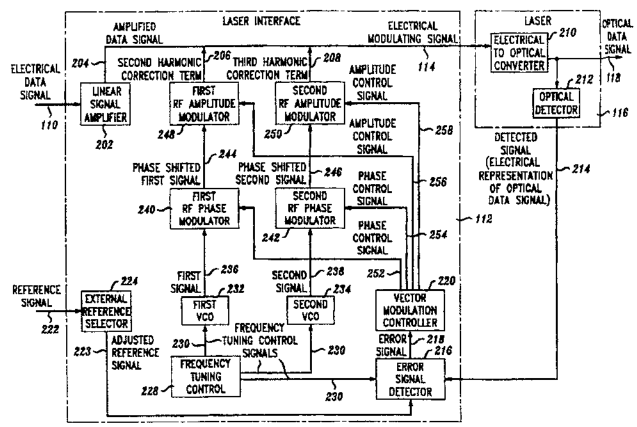
5,473,460 Dec. 5, 1995

Adaptive Equalizer for Analog Optical Signal Transmission

Inventors: Mark Haner and Robert K. Montgomery.
Assignee: AT&T Corp.
Filed: July 25, 1994.

Abstract—An adaptive equalizer (also called a laser interface) for generating an electrical modulating signal for use by a laser to modulate an optical data signal. The laser has a nonlinear modulation response pattern such that the optical data signal comprises a primary data signal and a plurality of harmonic distortion products. The adaptive equalizer operates by generating a correction electrical signal having a frequency equal to a frequency of one of the harmonic distortion products (this harmonic distortion product is nulled by operation of the adaptive equalizer). The adaptive equalizer detects the phase and amplitude of the harmonic distortion product. Then the adaptive equalizer phase shifts the correction electrical signal in accordance with the detected phase such that the correction electrical signal and the harmonic distortion product are conjugately matched. The adaptive equalizer amplifies the phase-shifted correction electrical signal in accordance with the detected amplitude such that the phase-shifted correction electrical signal and the harmonic distortion product are equal in amplitude. Then, the amplified and phase shifted correction electrical signal is combined with an electrical data signal to form the electrical modulating signal.

12 Claims, 7 Drawing Sheets



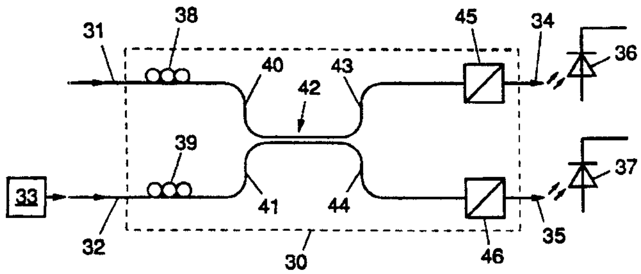
5,473,463 Dec. 5, 1995

Optical Hybrid

Inventor: Mattijs O. van Deventer.
Assignee: Koninklijke PTT Nederland N.V.
Filed: May 13, 1993.

Abstract—In known coherent optical receivers with two detectors, optical 90° hybrids have a throughput ≤25%. Theoretical analysis shows that a higher throughput, up to a maximum of approximately 29.3%, is possible. The invention provides such a 90° hybrid (**30**) of the polarization type. In an optical hybrid (**3**) having a structure known per se, i.e., polarization controllers (**38, 39**) at the inputs (**40** and **41**) of a power coupler (**42**), and polarizers (**45, 46**) at the outputs (**43** and **44**) thereof, the polarization controllers and the polarizers are put into such positions that the points on the Poincaré sphere, which correspond to those positions, comply with two conditions which guarantee a 90° phase difference and the higher throughput. For example, the positions correspond to points that represent positions in which the polarization controllers produce mutually opposite elliptical polarizations at an angle α and the polarizers are placed linearly at angles α and $-\alpha$, and $\alpha = 32.8°$.

6 Claims, 2 Drawing Sheets



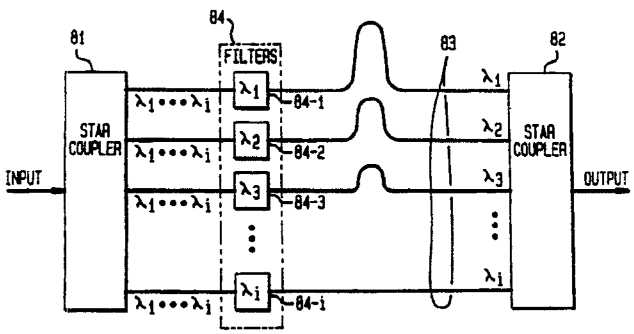
5,473,719 Dec. 5, 1995

Optical Dispersion Compensator

Inventor: Julian Stone.
Assignee: AT&T Corp.
Filed: Sept. 19, 1994.

Abstract—Pulse broadening in a single-mode optical transmission system due to a wavelength dispersion is reduced by separating the different wavelength components and selectively delaying them. Upon recombination, the original phases of the wavelength components are restored, and the pulses narrowed. By using exclusively single mode devices, essentially lossless operation is realized.

6 Claims, 3 Drawing Sheets



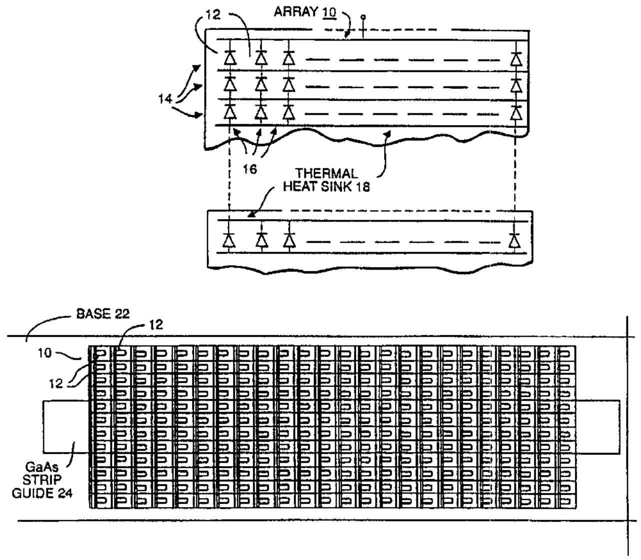
5,475,349 Dec. 12, 1995

Frequency Multipliers Using Diode Arrays

Inventor: Marvin Cohn.
Assignee: Westinghouse Electric Corp.
Filed: Sept. 29, 1994.

Abstract—A frequency multiplier in which one or more varactors each include arrays of Schottky barrier diodes combined in rows of parallel-connected diodes and columns of series-connected diodes. The arrays are dispersed on a thermal substrate, or confined to a GaAs strip guide on a suitable substrate and in either case employed in various discrete-component or integrated circuit transmissions systems. These series-parallel arrays can be increased in size as desired for power-handling capabilities or thermal dissipation and provide readily selectable impedance levels and breakdown voltages. These properties make the frequency multipliers useful in microwave and millimeter-wave systems, including those requiring high-power transmitters.

10 Claims, 3 Drawing Sheets



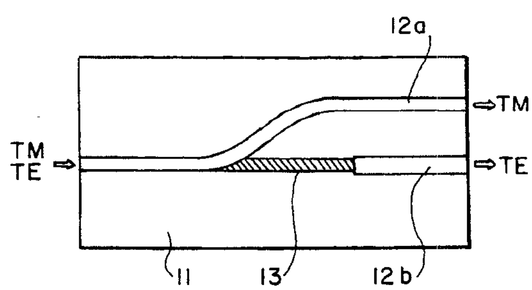
5,475,771 Dec. 12. 1995

Polarization Splitter Having an Anisotropic Optical Waveguide

Inventor: Toru Hosoi.
Assignee: NEC Corporation.
Filed: Apr. 1, 1994.

Abstract—A polarization splitter comprises an optical waveguide formed on a substrate and having an S-shaped curve portion, for permitting propagation of two linearly polarized lights orthogonal to each other therethrough, and an anisotropic optical waveguide branching from the beginning of the S-shaped curve portion, into which is guided one of the two linearly polarized lights alone.

2 Claims, 1 Drawing Sheet



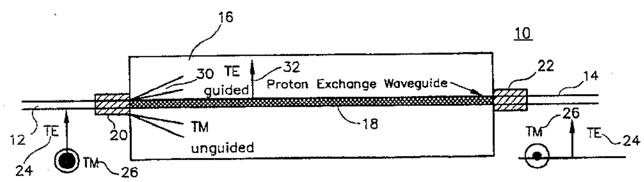
5,475,772 Dec. 12, 1995

Spatial Filter for Improving Polarization Extinction Ratio in a Proton Exchange Wave Guide Device

Inventors: Henry H. Hung and Ren-Young Liu.
Assignee: Honeywell Inc.
Filed: June 2, 1994.

Abstract—A proton exchange polarizer with a spatial filter positioned to reduce cross coupling of unguided radiation. A photoconductor substrate is fabricated from $LiNbO_3$ or $LiTaO_3$. The substrate has a spatial filter located at a primary reflection point on a bottom of the substrate so as to block unguided TM mode light from reaching the output of the substrate. The spatial filter is fabricated by physical or chemical methods such as saw cutting, diamond machining, etching, micro-machining, laser-machining and/or damaging the surface of the substrate. The unguided TM mode light is attenuated by blockage or interruption of the transmissive region.

15 Claims, 8 Drawing Sheets



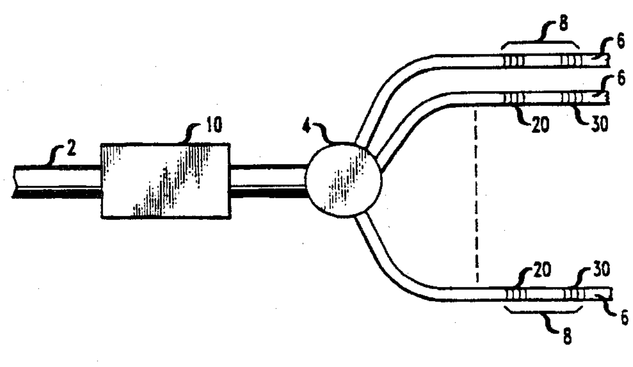
5,475,780 Dec. 12, 1995

Optical Waveguiding Component Comprising a Band-Pass Filter

Inventor: Victor Mizrahi.
Assignee: AT&T Corp.
Filed: June 17, 1993.

Abstract—An optical filter is adapted for selectively transmitting electromagnetic radiation within a wavelength passband bounded by a pair of stop bands of relatively low transmissivity. The filter includes at least one Bragg grating formed in a waveguiding optical medium. The Bragg grating has at least one wavelength band of relatively low transmissivity. This low-transmissivity band corresponds to at least a portion of one of the stop bands of the filter.

11 Claims, 6 Drawing Sheets



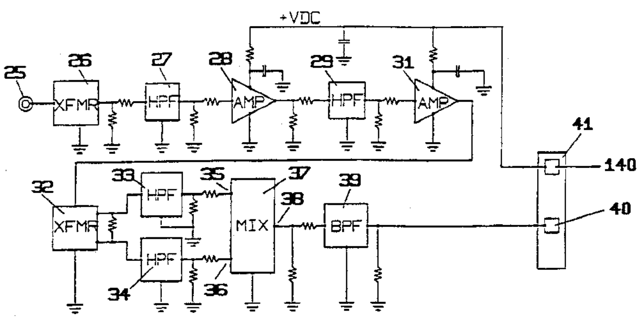
5,477,150 Dec. 19, 1995

Electric ARC and Radio Frequency Spectrum Detection

Inventors: Howard M. Ham, Jr. and James J. Keenan.
Assignee: Hendry Mechanical Works.
Filed: June 27, 1994.

Abstract—A principal object of the invention is to detect sparks or arcs (**12**) in electric circuits (**13**) or otherwise to detect a spectrum of a broad band of distinct instaneous radio frequencies in radio frequency noise. The invention rejects extraneous narrow-band signals having frequencies within the broad band, such as by means of filters (**21**, **27**, **29**) or a balanced mixer arrangement (**32–39**). The mixer **37** may be fed from a radio frequency signal duplicator (**32**, **33**, **34**) having an input (**25**) coupled to a source of the spectrum, a first output for one spectrum a duplicated by that duplicator connected to one mixer input (**35**), and a second output for the other spectrum as duplicated by that duplicator connected to tile other mixer input (**36**). Alternatively, the radio frequency mixer (**37**) may receive the output of a wide band noise generator (**68**) at its other input (**36**, FIG. 5). A combination of multitude of the distinct instantaneous radio frequencies indicative of the spectrum or the arc (**12**) is detected, such as with a frequency combination detector (**42**) having an input (**40**) coupled to the radio frequency mixer output (**38**).

21 Claims, 5 Drawing Sheets



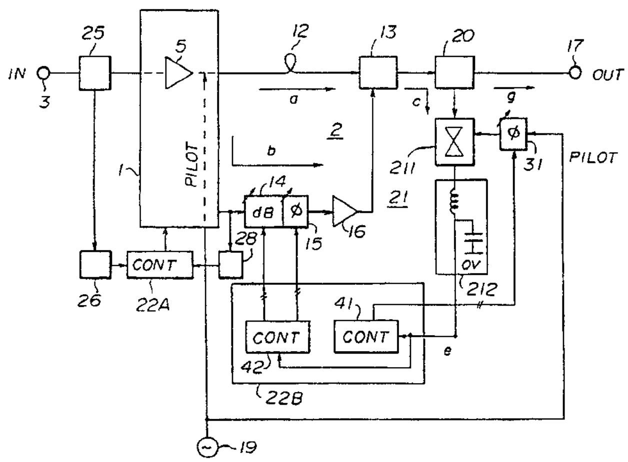
5,477,187 Dec. 19, 1995

Feed-Forward Amplifier

Inventors: Fumihiko Kobayashi, Isamu Umino, Yoshiyasu Tsuruoka, Junichi Hasegawa, Toshiaki Suzuki, Tomohiro Nakamura, Teruhiko Kitazawa, and Mitsunori Hanaka.
Assignee: Fujitsu Limited.
Filed: Mar. 17, 1993.

Abstract—In a feed-forward amplifier, an rf amplifier is supplied with an input rf signal at an input terminal for amplifying the same; a distortion extraction loop supplied with the input rf signal and further with the output rf signal from the rf amplifier is for extracting nonlinear distortion components formed in the output rf signal as a result of amplification in the rf amplifier; a variable phase shifter is provided in the distortion extraction loop for varying a phase of the input rf signal; a variable attenuator is provided in the distortion extraction loop for attenuating an amplitude of the input rf signal that has been supplied to the distortion extraction loop; and a distortion extraction circuit is provided in the distortion extraction loop for producing a distortion output signal that includes nonlinear components; further, a control circuit is supplied with the input signal and with the distortion output signal for extracting a main signal component contained in the distortion output signal. The control circuit controls the variable phase shifter and the variable attenuator such that a ratio of the main signal component level with respect to the input rf signal level is decreased.

12 Claims, 25 Drawing Sheets



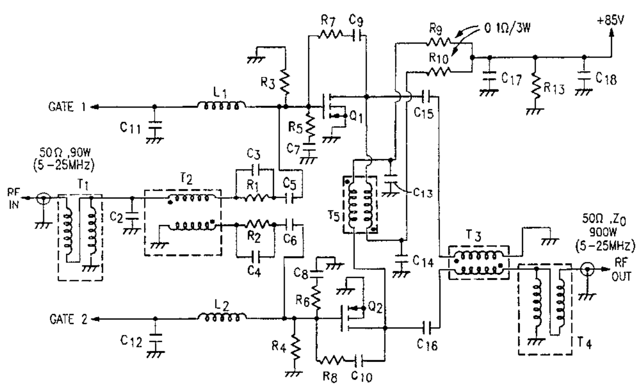
5,477,188 Dec. 19, 1995

Linear RF Power Amplifier

Inventors: Yogendra K. Chawla and Leonid Reyzelman.
Assignee: ENI.
Filed: July 14, 1994.

Abstract—A linear rf power amplifier employs push-pull pairs of high-voltage mosfet's. A minimum of transformers is employed, with an impedance-matching transformer feeding an input balun supplying the input signal in push-pull to the gates of the mosfets. The drains are coupled to balanced legs of an output balun, followed by an output impedance-matching transformer. Thermal sensors are employed for control of gate bias and also for control of drain voltage. The temperature sensors are mounted in the air inlet path and on the spreader plate of the heat sink. An aluminum or fiberglass strap is used to press the transistors against the spreader plate thereby ensuring good thermal contact with the transistor dies.

8 Claims, 6 Drawing Sheets



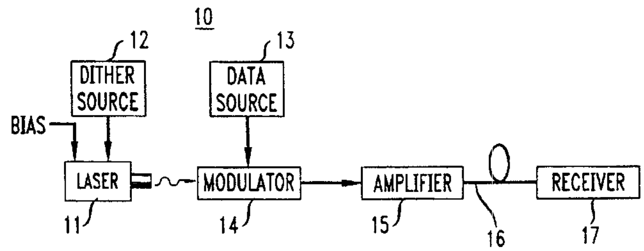
5,477,368 Dec. 19, 1995

High-Power Lightwave Transmitter Using Highly Saturated Amplifier for Residual AM Suppression

Inventors: Lars E. Eskildsen and Per B. Hansen.
Assignee: AT&T Corp.
Filed: Dec. 29, 1994

Abstract—Stimulated Brillouin scattering has been effectively suppressed and the effect of residual amplitude modulation has been mitigated in a dithered optical transmitter by injecting the dithered optical signal into an optical device, such as a highly saturated amplifier, whose small-signal intensity response at the dither frequency dampens the residual amplitude modulation thereby decreasing the eye closure (alternatively, increasing the eye pattern opening). The optical device (e.g., the highly saturated amplifier) exhibits a low-frequency cutoff (−3 dB) at a frequency greater than or equal to the inverse of the round trip time for a fiber span with the effective optical transmission length into which the optical signal power is launched. The dither rate is generally in the neighborhood of or below the low cutoff frequency.

12 Claims, 5 Drawing Sheets



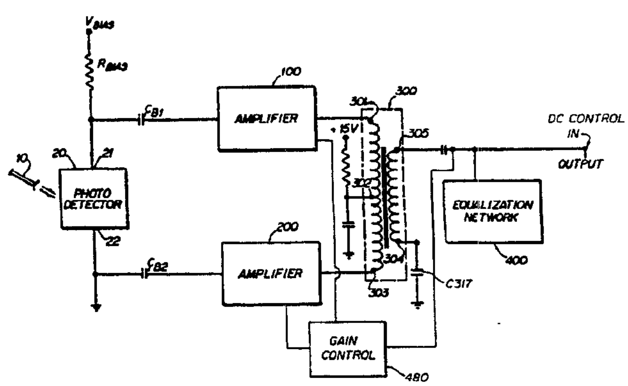
5,477,370 Dec. 19, 1995

Push–Pull Optical Receiver Having Gain Control

Inventors: Frank R. Little, Herman A. Kruse, John G. Megna, and Rezin E. Pidgeon.
Assignee: Scientific-Atlanta, Inc.
Filed: Aug. 22, 1994.

Abstract—A receiver is described for optical signals that are amplitude modulated with broadband radio frequency signals. The receiver includes an optical detector, which receives the incoming optical signal, and generates a radio frequency electrical signal, which varies with the power level of the incoming optical signal. This electrical signal is applied to a pair of amplifiers that are connected in a push–pull relationship. A gain control circuit controls the gain of the amplifier pair.

12 Claims, 3 Drawing Sheets



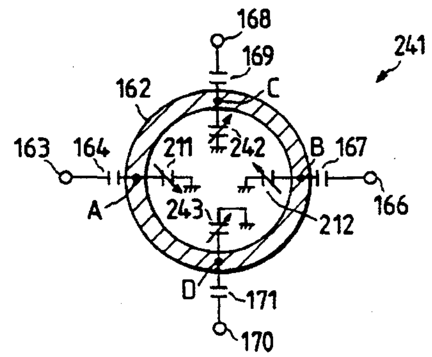
5,479,142 Dec. 26, 1995

Strip Dual Mode Filter in Which a Resonance Width of a Microwave is Adjusted and Dual Mode Multistage Filter in Which the Strip Dual Mode Filters are Arranged in Series

Inventors: Kazuaki Takahashi, Munenori Fujimura, Hiroyuki Yabuki, and Mitsuo Makimoto.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Aug. 17, 1994.

Abstract—A strip dual-mode filter consists of a strip line ring resonator having an electric length equivalent to a resonance wavelength λ_o for resonating microwaves at the resonance wavelength λ_o according to a characteristic impedance thereof, an input coupling capacitor for transmitting the microwaves from an input terminal to a coupling point A of the ring resonator, an output coupling capacitor for outputting the microwaves resonated in the ring resonator from a coupling point B of the ring resonator to an output terminal, and a phase-shifting circuit connected to a coupling point C and a coupling point D of the ring resonator for changing the characteristic impedance of the ring resonator by shifting a phase of the microwave by a multiple of a half-wavelength of the microwaves. The coupling point B is spaced a quarter-wavelength of the microwaves apart from the coupling point A, the coupling point C is spaced the half-wavelength of the microwaves apart from the coupling point A, and the coupling point D is spaced the half-wavelength of the microwaves apart from the coupling point B.

21 Claims, 15 Drawing Sheets



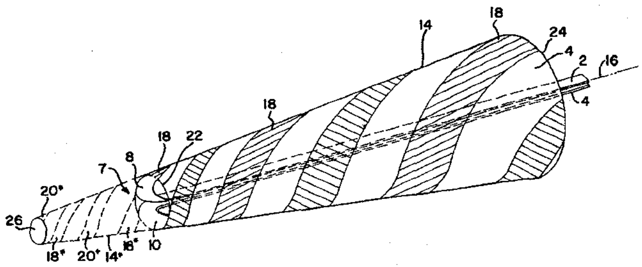
5,479,180 Dec. 26, 1995

High-Power Ultra-Broadband Antenna

Inventors: Erik H. Lenzing, Harry F. Lenzing, and Charles D. Hechtman.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Mar. 28, 1994.

Abstract—A hybrid antenna in which the flared end of a parallel plate of a transmission line is coupled to a frequency-independent antenna so as the take the place of the higher frequency radiating portion of the antenna.

5 Claims, 3 Drawing Sheets



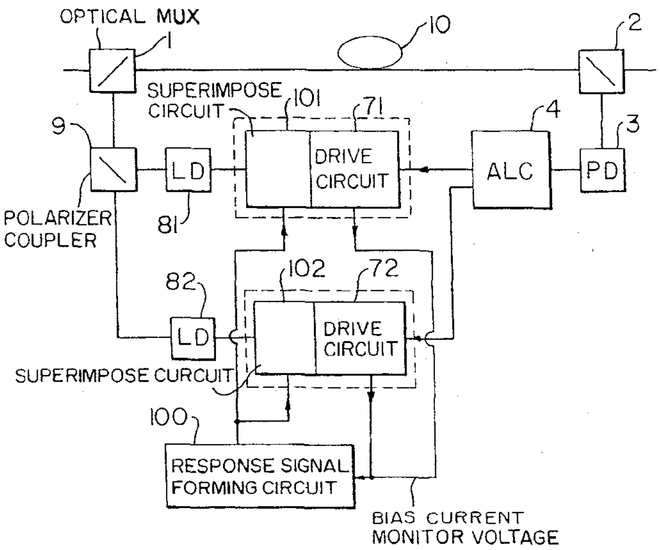
5,479,423 Dec. 26, 1995

Method of Modulating Feedback Signal in Optical Amplifier to Compensate for Pump Laser Saturation

Inventor: Kazuyuki Tanikawa.
Assignee: Fujitsu Limited.
Filed: Jan. 31, 1994.

Abstract—In modulating a feedback signal in an optical amplifier employing a laser diode LD, which can directly amplify an optical signal, the amplified optical signal is modulated by the feedback signal SV, which is controlled in such a way as to compensate for the saturation characteristics of the laser diode LD to correctly modulate the feedback signal even if the laser diode is nearly saturated due to again or fluctuations in temperature.

9 Claims, 5 Drawing Sheets



5,479,539 Dec. 26, 1995

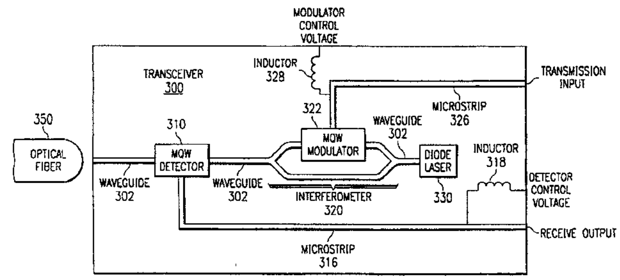
Integrated Optical Transmitter and Receiver

Inventors: Charles L. Goldsmith and Bradley M. Kanack.
Assignee: Texas Instruments Incorporated.
Filed: June 15, 1994.

Abstract—An optical–electrical transmitter/receiver (**300**) with an optical detector (**310**) for reception that may be made transparent for optical trans-

mission. This permits transmission (**320, 330**) and reception (**310**) devices to be positioned in series on a single integrated circuit.

12 Claims, 9 Drawing Sheets



5,479,542 Dec. 26, 1995

All-Fiber in Line Optical Isolator

Inventor: Sergej Krivoshlykov.
Assignee: CeramOptec Industries Inc.
Filed: June 9, 1994.

Abstract—The present invention is directed at an all-fiber in line isolator. The basic isolator includes a monomode optical fiber, a multimode waveguide, a coil or other traditional means to generate a magnetic field, and a fiber block or other traditional means to couple the fiber to the waveguide. In one embodiment, the fiber has a core and a cladding and maintains a circular state of light polarization. The fiber has a coupling region where the cladding is partially removed. The waveguide evanescently couples to the fiber along the coupling region. The waveguide has magnetooptical properties such that applying a magnetic field along it causes backward propagating light to transfer to the waveguide with minimal disturbance to forward propagating light. Other embodiments using birefringent optical fibers are disclosed as well.

19 Claims, 3 Drawing Sheets