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.

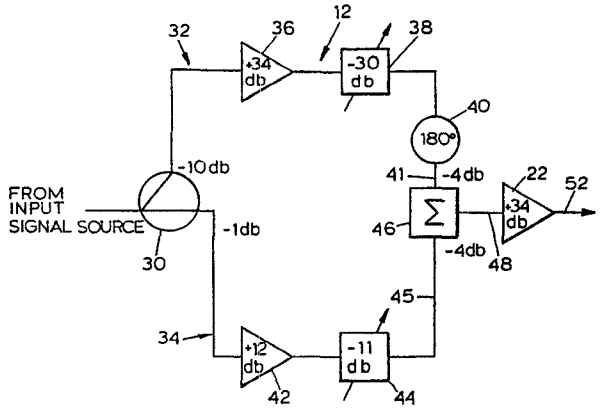
5,258,722 Nov. 2, 1993

Amplifier Circuit with Distortion Cancellation

Inventor: Michael F. Jeffers.
Assignee: General Instrument Corporation, Jerrold Communications.
Filed: Dec. 13, 1991.

Abstract—A circuit for amplifying an input signal includes an output amplifier that develops an output signal including distortion at a first magnitude and phase displacement when a signal of a second magnitude is applied thereto, and a further amplifier wherein the amplifiers have substantially identical gains and distortion characteristics and are operated at substantially the same input and output levels. The further amplifier is included in a circuit responsive to the input signal wherein the circuit provides an intermediate signal to the output amplifier. The intermediate signal includes a first signal portion comprising a scaled version of the input signal and a second signal portion comprising distortion at substantially the first magnitude and at a phase displacement substantially 180° out of phase relative to the first phase displacement. The output amplifier amplifies the intermediate signal and distortion in the output signal is substantially canceled by application of the second portion of the intermediate signal to the output amplifier.

12 Claims, 4 Drawing Sheets



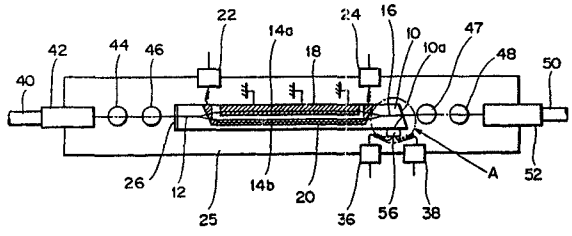
5,259,044 Nov. 2, 1993

Mach–Zehnder Optical Modulator with Monitoring Function of Output Light

Inventors: Hideki Isono, Junko Watanabe, Hiroki Okushima, Tadao Shingyoji.
Assignee: Fujitsu Limited.
Filed: May 5, 1992.

Abstract—A Mach–Zehnder optical modulator with an output light monitoring function whereby emitted light from the modulator is monitored for controlling a DC bias voltage applied between a first and a second electrode provided on a first and a second branch optical waveguide. The end face of the waveguide substrate on the output side is obliquely formed, and an optical waveguide is provided on the waveguide substrate for taking out reflected light from the output end face as monitor light. A photodetector for detecting the monitor light is attached to the side face of the waveguide substrate. By such arrangement, the length of the waveguide substrate can be made shorter than that in the prior art. As an alternative, such an arrangement may be made that a double refraction crystal for separating monitor light is attached to the end face on the output side of the waveguide substrate and a prism for correcting optical path is attached to the double refraction crystal.

7 Claims, 6 Drawing Sheets



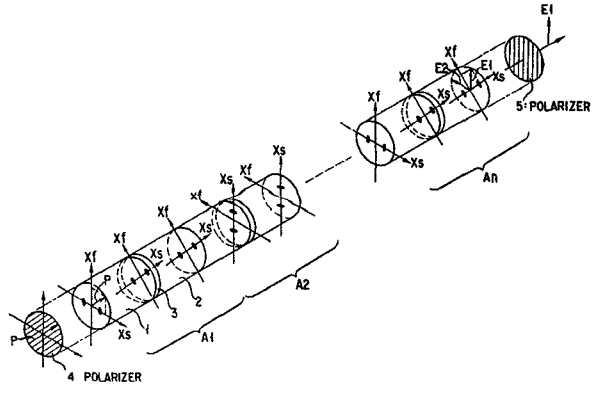
5,259,048 Nov. 2, 1993

Optical Equalizer

Inventor: Takeshi Ozeki.
Assignee: Kabushiki Kaisha Toshiba.
Filed: Sept. 11, 1992.

Abstract—When a light wave passes through an optical fiber used as an optical communication line, different time delays are introduced in its frequency components according to the delay characteristic of the optical fiber, limiting the usable bandwidth. An optical equalizer according to the present invention comprises a multi-stage connection of one or more unit optical circuit elements for introducing time delays opposite to the delay characteristic of the optical fiber in frequency components in the neighborhood of the transmission band used. The optical equalizer is placed at the input end of a transmission line and equalizes time delays of the frequency components passing through the transmission line, thereby expanding the usable bandwidth.

13 Claims, 7 Drawing Sheets



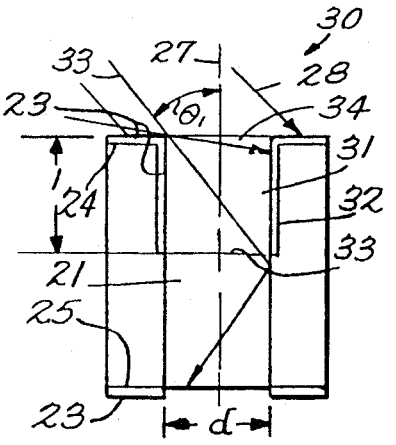
5,259,057 Nov. 2, 1993

Waveguide Array and Method for Contrast Enhancement

Inventor: Lee M. Cook.
Assignee: Galileo Electro-Optics Corporation.
Filed: Mar. 18, 1992.

***Abstract*—An FOFP has a darkened surface layer in the cladding portion to reduce cross-talk. One embodiment has an intagliated surface with darkened cavity walls. Darkening is achieved on a finished piece without further reworking. The surface is substantially free of fluorescence and is substantially non-conductive.**

23 Claims, 1 Drawing Sheet



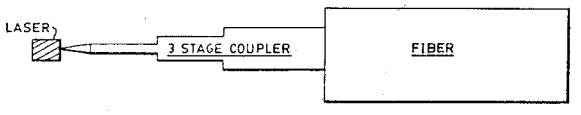
5,261,017 Nov. 9, 1993

Optical Waveguide Enhanced Laser to Fiber Coupling

Inventors: Paul Melman and Jagannath Chirravuri.
Assignee: GTE Laboratories, Inc.
Filed: Nov. 17, 1992.

***Abstract*—Apparatus for improving the coupling efficiency of a laser to a single-mode fiber by means of an intermediate waveguide is disclosed. For uniform waveguides, maximum improvement results when waveguide's mode field radii MFR is designed as the geometrical mean of the MFR of the laser and the MFR of the fiber. The apparatus can be extended to multi-stage couplers. Each successive stage is designed to have a spot size that is the geometric mean of the section before and after. With only a small number of stages significant improvement in coupling efficiency can be realized.**

12 Claims, 5 Drawing Sheets



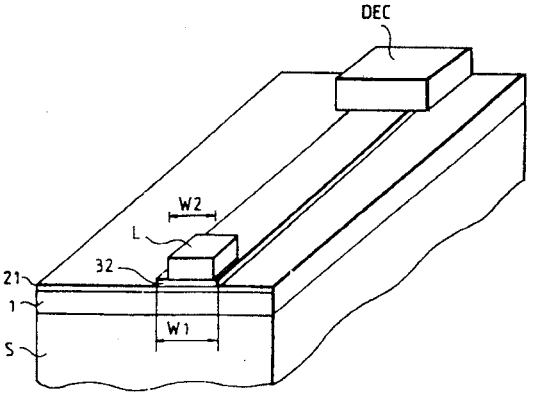
5,262,656 Nov. 16, 1993

Optical Semiconductor Transceiver with Chemically Resistant Layers

Inventors: Robert Blondeau, Daniel Rondi, Jean-Charles Renaud.
Assignee: Thomson-CSF.
Filed: June 3, 1992.

***Abstract*—An opto-electronic device that monolithically integrates a laser emitter and an optical detector positioned in-line on a single waveguide, in which the laser emitter and detector operate at different wavelengths. Such an opto-electronic device may find particular application in various transmission or telecommunication systems.**

7 Claims, 5 Drawing Sheets



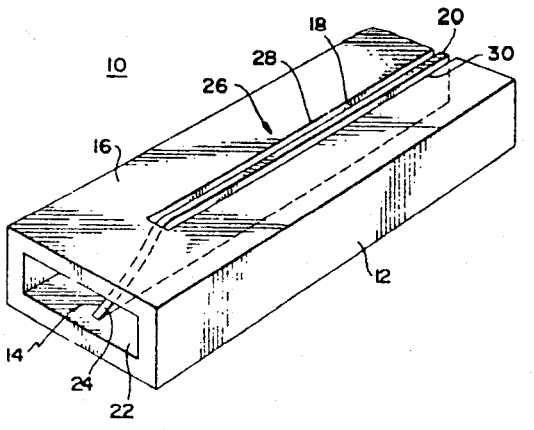
5,262,739 Nov. 16, 1993

Waveguide Adaptors

Inventor: G. Conrad Dalman.
Assignee: Cornell Research Foundation, Inc.
Filed: Oct. 30, 1992.

***Abstract*—A waveguide adaptor or transition for interfacing a microwave waveguide to a coplanar transmission line or electronic device is disclosed. The adaptor includes a waveguide section having an integral coplanar transmission line formed in a longitudinal slot in a top wall thereof. A metallic fin is disposed in the waveguide that extends into the slot. The transmission line is coplanar because the edges of the slot on either side of the fin both act as ground planes. A tapered portion of the fin gradually rises from the bottom surface of the waveguide into the slot that acts as an impedance-matching structure between the waveguide and the transmission line. Numerous circuit elements can be connected to the transmission line so that the adaptor can be used to fabricate oscillators, amplifiers, filters, and other devices. In particular, a Gunn oscillator formed with the adaptor is disclosed. In another embodiment, the fin is made out of insulating material having conductive patterns disposed on both sides to form a conventional waveguide to coplanar waveguide transition.**

11 Claims, 10 Drawing Sheets



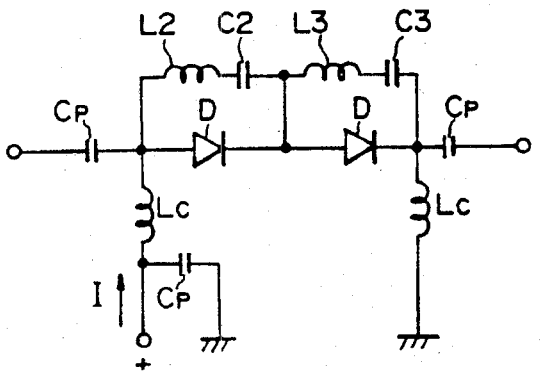
5,262,741 Nov. 16, 1993

Attenuator for High-Frequency Signal

Inventor: Kazuto Kitakubo.
Assignee: Sony Corporation.
Filed: May 22, 1992.

Abstract—A high-frequency PIN diode attenuator uses an inductive element in parallel with the PIN diode. The inductor resonates with the parasitic capacitance of the PIN diode to increase the attenuation level.

6 Claims, 5 Drawing Sheets



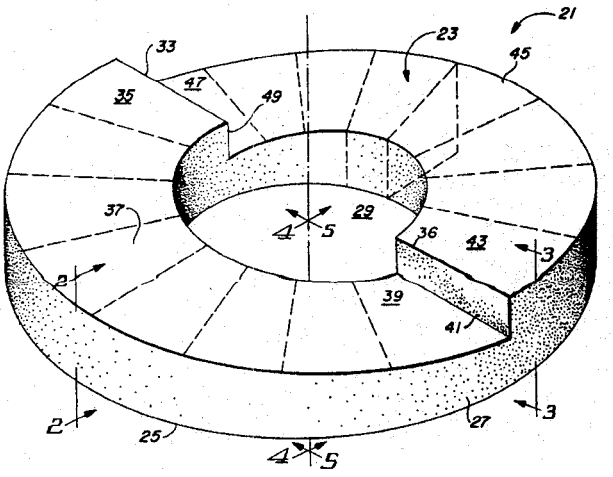
5,262,889 Nov. 16, 1993

Optical Frequency Shifter

Inventor: David Fink.
Assignee: Hughes Aircraft Company.
Filed: Apr. 21, 1992.

Abstract—A method and apparatus for frequency shifting an optical beam where the frequency shifted beam remains both spatially and temporally coherent with no spread in frequency and can be continually tuned in frequency shift over a wide range without any change in beam pointing or beam quality with time. This is achieved by changing the effective optical path length of the resonant cavity of a laser by translating an optical wedge, such as a prism, across the optical path in the direction of the wedge gradient. In a first embodiment, a rotating helical phase plate is used to linearly increase the optical path of a transmitted or reflected beam with time, thereby frequency shifting the exiting beam. In another embodiment, the rim of a wheel with a spirally increasing or decreasing radius is used in which the outer periphery of the wheel is a mirror. Spinning the wheel at a constant rotational speed increases or decreases the optical path of a reflected beam linearly with time, thereby frequency shifting the reflected beam. The helical phase plate can be used in either a transmissive mode or a reflective mode, whereas the spiral wheel is used primarily in a reflective mode.

28 Claims, 3 Drawing Sheets



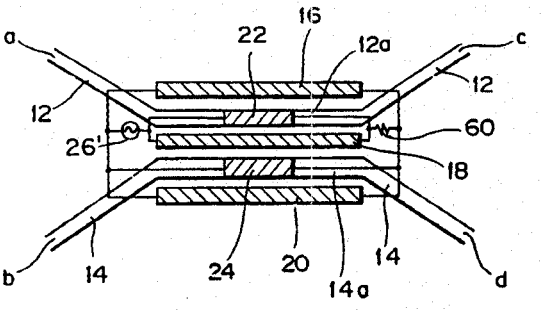
5,263,102 Nov. 16, 1993

Polarization-Independent Optical Switches/Modulators

Inventor: Hironao Hakogi.
Assignee: Fujitsu Limited.
Filed: Oct. 3, 1991.

Abstract—A polarization-independent optical switch/modulator provides a pair of waveguides having mutually parallel portions spaced apart a distance allowing directional coupling therebetween. A set of first electrodes of an embedded type are disposed in the waveguide substrate in the vicinity of both sides of the optical waveguides for controlling polarized light having the electric field component in the direction parallel to the surface of the waveguide substrate. Further, a set of second electrodes are disposed on the optical waveguides for controlling polarized light having the electric field component perpendicular to the surface of the waveguide substrate. The lengths of the first and second electrodes are set to have a predetermined ratio therebetween, and the first and second electrodes are connected to a common power source.

6 Claims, 5 Drawing Sheets



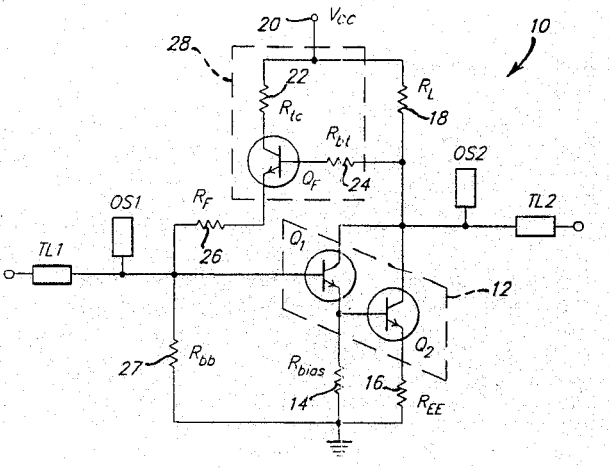
5,264,806 Nov. 23, 1993

Bipolar Microwave Monolithic Amplifier with Active Feedback

Inventor: Kevin W. Kobayashi.
Assignee: TRW, Inc.
Filed: May 26, 1992.

Abstract—A bipolar transistor is used as an active feedback inductor to emulate the frequency dependant impedance characteristics of a spiral inductor at microwave frequencies using active techniques. The active feedback is biased by several resistors. By substituting active feedback for a conventional spiral inductor, the chip layout can be reduced by as much as 50%. The bandwidth of the device can be controlled by choosing appropriate tuning resistor values to bias the active feedback inductor when fabricating the chip. By changing the value of these tuning resistors, the inductance created can be directly controlled, which in turn affects the frequency response of the device.

10 Claims, 3 Drawing Sheets



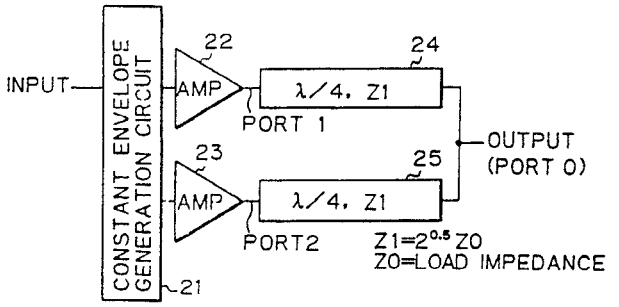
5,264,807 Nov. 23, 1993

High Frequency Power Amplifier with High Efficiency and Low Distortion

Inventors: Naofumi Okubo, Yoshihiko Asano, Hiroshi Kurihara, Yoshimasa Daido, Kazuhiko Kobayashi, Shuji Kobayakawa, Toru Maniwa.
Assignee: Fujitsu Limited.
Filed: Aug. 13, 1991.

Abstract—A high frequency amplifier containing: a constant envelope signal generation circuit for transforming an input signal to form two constant envelope signals where phases of the constant envelope signals correspond to an amplitude of an envelope of the input signal; two amplifying circuits for separately amplifying two constant envelope signals; and a power synthesizing circuit for synthesizing the first and second amplified signals to generate an amplified signal of the input electric signal, and reflect remaining components of the first and second amplified signals which remaining components remain in the above synthesizing operation toward the first and second amplifying circuits. Further, an input impedance of the power synthesizing circuit may be controlled by shifting phases of the above reflected components by respectively predetermined amounts, or by adaptively shifting phases of the above reflected components responding to an input level, so that a total efficiency of the high frequency amplifier is maximized. The high frequency amplifier may contain, instead of the above two amplifying circuits and the power synthesizing circuit, a circuit for inverting a phase of one of the two constant envelope signals, a single-ended push-pull amplifier circuit for receiving the other of the two constant envelope signals, and an output of the phase inversion circuit, synthesizing the received signals to generate an amplified signal of the input electric signal.

10 Claims, 6 Drawing Sheets



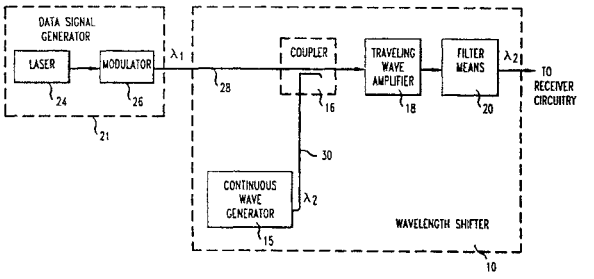
5,264,960 Nov. 23, 1993

Optical Wavelength Shifter

Inventor: Bernard Glance.
Assignee: AT&T Bell Laboratories.
Filed: May 8, 1992.

Abstract—High bit rate optical wavelength shifters that are fully tunable within a bandwidth of interest are realized using a traveling wave semiconductor optical amplifier that impresses a representation of data modulated on an optical signal at a first wavelength onto an optical signal of weaker signal strength at a second, desired wavelength. The data representation is impressed on the second optical signal through use of the gain-saturation effect that occurs in the traveling wave semiconductor optical amplifier. The traveling wave (single pass) amplifier receives simultaneously the modulated optical signal at the first wavelength and the second optical signal at the desired wavelength. The first optical signal affects the gain of the traveling wave amplifier as seen by the second optical signal so as to impress a representation of variations in the envelope of the first optical signal onto the second optical signal.

22 Claims, 6 Drawing Sheets



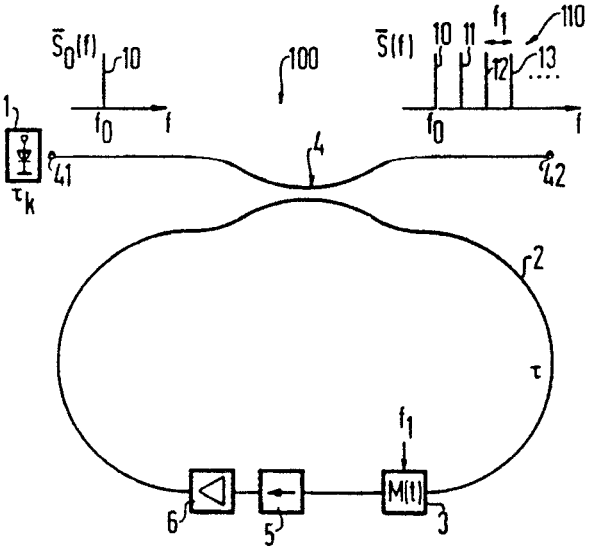
5,265,112 Nov. 23, 1993

Optical Comb Generator

Inventors: Brnd Noll, Franz Auracher, Alfred Ebberg.
Assignee: Siemens Aktiengesellschaft.
Filed: July 27, 1992.

Abstract—For reducing power fluctuations of spectral lines of a comb generator having an annularly closed waveguide, a coupler for coupling light from a separate light source into the waveguide and out of the waveguide and also a sideband modulator, the light circulating in the waveguide can be either separately modulated or the sideband modulator can be operated to have only sidebands of the same operational sign of a frequency shift, or with an amount being selected according to a particular arrangement, or can have both positive and negative frequency shifts with the amount being selected by a different formula, or the length of the annularly closed waveguide can be dimensioned so that the size of the round-trip time of the light circulating in the waveguide is longer than the defined coherent time of the reference laser light. It is also possible to incorporate various combination of these alternative ways of reducing the power fluctuation

22 Claims, 4 Drawing Sheets



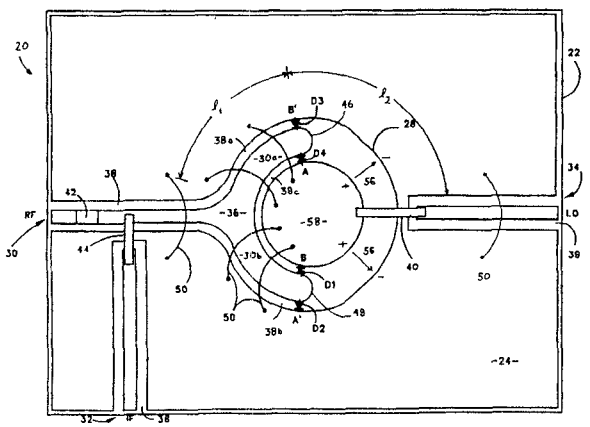
5,265,266 Nov. 23, 1993

Resistive Planar Star Double-Balanced Mixer

Inventor: Trang N. Trinh
Assignee: Rockwell International Corporation.
Filed: Apr. 2, 1991.

Abstract—A passive uniplanar double-balanced star RF mixer, comprising a substantially planar support substrate with a conductive layer of material disposed on one side and a slotline and first, second, and third coplanar waveguides formed therein that are configured to accommodate different frequencies. The first waveguide is bifurcated on one end into two waveguide branches that form first and second waveguide terminations, each physically coupled to one end of the slotline. The second waveguide is electrically coupled to the first waveguide at a location spaced apart from the branches. The third waveguide is electrically coupled to the slotline at a position located approximately equi-distant from the slotline ends. A first grounding element is connected to the grounds of the first and third waveguides and is positioned adjacent to the first branch termination. A conductive surface is enclosed by the waveguide branches and the slotline. This enclosed conductive surface has its smallest planar dimension large relative to the width of the slotline. The enclosed surface is further connected to the first and second grounding element across the coplanar waveguide branches. A second grounding element is connected to the grounds for the second and third waveguides and is positioned adjacent to the second branch termination. First and second diodes are connected by a cathode to the center conductor of the first waveguide first end termination and at an anode to the first grounding element and the enclosed conductive surface. Third and fourth diodes are connected by an anode to the center conductor of the first waveguide the second end termination and at cathodes to the second grounding element and the enclosed conductive surface.

19 Claims, 7 Drawing Sheets



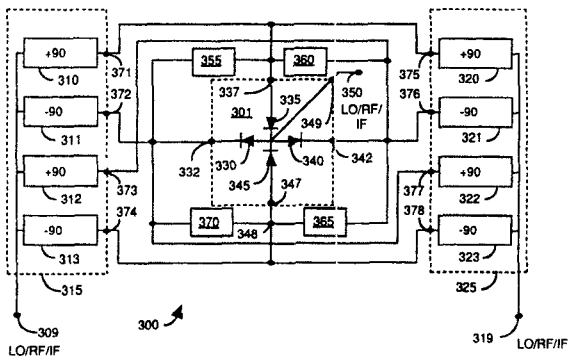
5,265,269 Nov. 23, 1993

Intermediate Frequency Independent Star Mixer

Inventors: Joseph Staudinger, Warren L. Seely, John M. Golio.
Assignee: Motorola, Inc.
Filed: June 21, 1991.

Abstract—An apparatus for mixing electrical signals including in combination: first signal splitting means having a radio frequency (RF) port and first, second, third and fourth signal ports, second signal splitting means having a local oscillator (LO) port and first, second, third and fourth signal ports, intermediate frequency (IF) port, and mixer element means, the mixer element means coupled to the first, second, third, and fourth signal ports of the first and second signal splitting means and coupled to the intermediate frequency port means, for mixing two of the RF, IF, and LO signals to produce the remaining signal.

25 Claims, 6 Drawing Sheets



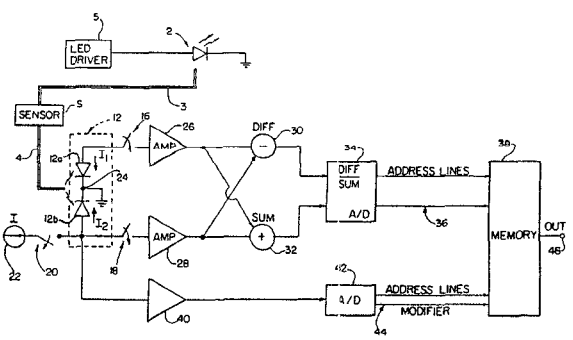
5,266,792 Nov. 30,1993

Temperature-Compensated Optical Detector

Inventors: David H. Crowne and William B. Spillman, Jr.
Assignee: Simmonds Precision Products, Inc.
Filed: Oct. 28, 1991.

Abstract—An optical wavelength detector includes a photoelectric device that produces a signal in response to incident light thereon corresponding to a characteristic of the incident light, such as wavelength. A light source is provided that can selectively expose light to the photoelectric device. A memory device stores device characterization data that corresponds wavelength information to current ratio signals from the photoelectric device. The current ratio signals are digitized and form part of the address for the memory. In a temperature compensated embodiment, the optical wavelength detector includes means to determine a temperature-dependent electrical characteristic of the photoelectric device. In the preferred embodiment, this electrical characteristic is the forward bias voltage detected when a predetermined forward bias current is applied to the photoelectric device in the dark. The temperature dependent forward bias voltage is converted to a digital signal and provides another part of the digital address for the memory. The memory generates a temperature compensated signal that corresponds to the incident light wavelength.

28 Claims, 7 Drawing Sheets



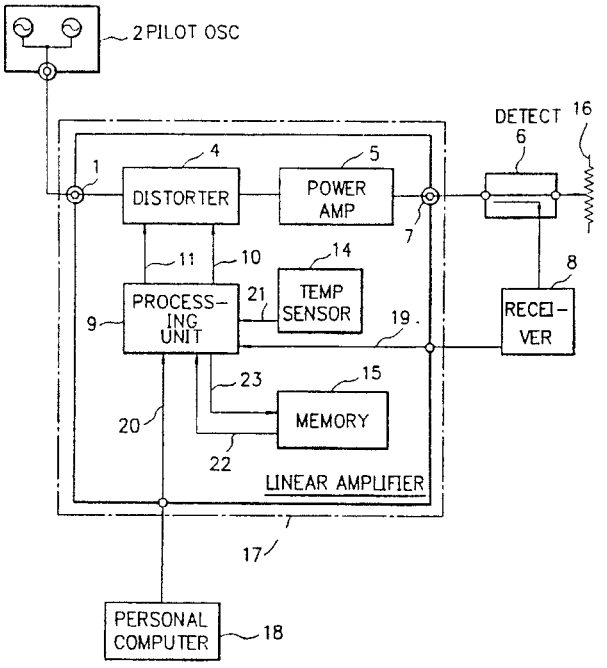
5,266,906 Nov. 30, 1993

Linear Amplifier Performing Distortion Compensation Control

Inventor: Atsushi Inahashi.
Assignee: NEC Corporation.
Filed: Oct. 29, 1992.

Abstract—A linear amplifier performing a continuous distortion compensation control with no line cut to prevent deterioration of intermodulation distortion and ensure talking quality including a power amplifier for amplifying a plurality of carriers and a distorter for generating an intermodulation distortion with an equal amplitude of an antiphase for negating an intermodulation distortion generated by the power amplifier. A processing unit outputs an attenuation value control voltage and a phase control voltage to the distorter, depending on an ambient temperature information detected by a temperature sensor and control voltage data corresponding thereto, read out of a memory.

3 Claims, 5 Drawing Sheets



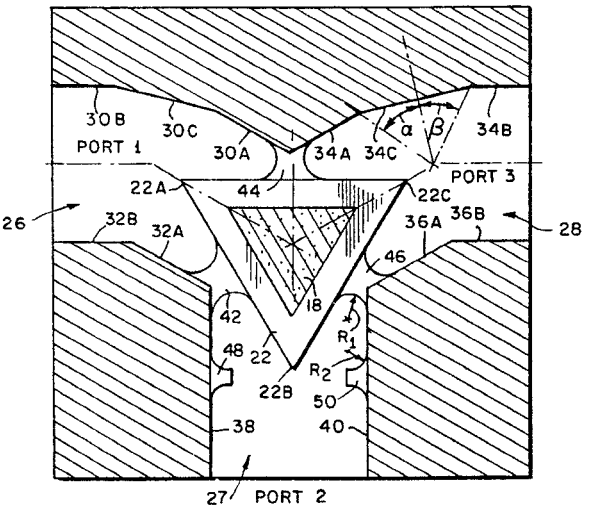
5, 266,909 Nov. 30, 1993

Waveguide Circulator

Inventor: Paul H. Wolfert.
Assignee: Harris Corporation.
Filed: Aug. 5, 1992.

Abstract—A circulator including a unique shaped transformer having triangular apexes extending symmetrically into the respective channel and connected to two opposed side walls by coplanar tabs One of the channel sidewalls has a minimum of three sections to provide a transition between a first linear section extending from the center junction and a second linear section extending from the port. The opposed sidewall has only two linear sections. The coplanar tabs are connected to the triangular apexes by a portion curved in the coplanar plane. One of the channels includes two opposed linear walls extending between the center and the port with a pair of opposed studs extending from each wall toward each other. These studs are coplanar with the tabs and are used for tuning. The studs also have a portion curved in the coplanar plane.

13 Claims, 3 Drawing Sheets



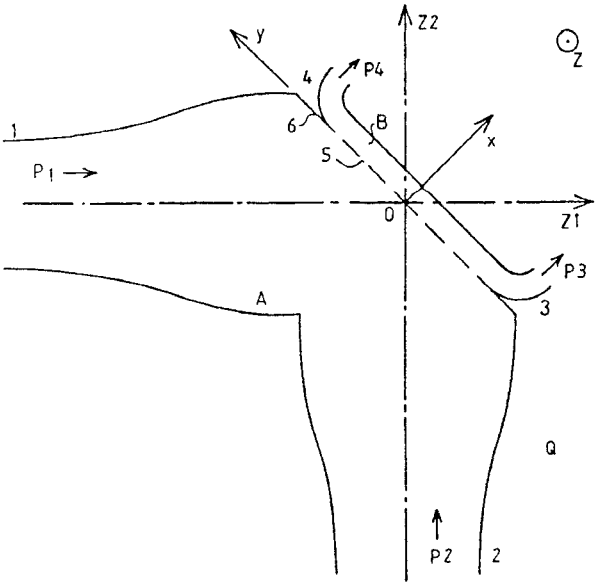
5,266,910 Nov. 30, 1993

Directional Coupler on Mirror Elbow for Microwaves

Inventor: Georges Mourier.
Assignee: Thomson Tubes Electroniques.
Filed: Apr. 8, 1992.

Abstract—Disclosed is a directional coupler on a mirror elbow for a microwave transmission line sized to convey very high power The coupler consists of a main guide with a mirror elbow and at least one secondary guide. The secondary guide is joined by one of its walls to the external surface of the mirror, and the interior of the secondary guide is joined to the interior of the mirror elbow by coupling holes.

8 Claims, 7 Drawing Sheets



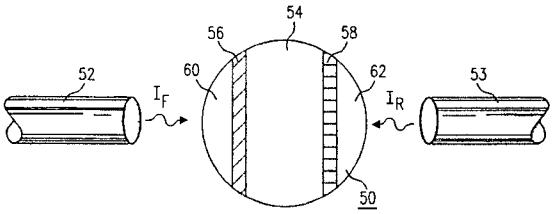
5,267,077 Nov. 30, 1993

Spherical Multicomponent Optical Isolator

Inventor: Greg E. Blonder.
Assignee: AT&T Bell Laboratories.
Filed: Nov. 5, 1990.

***Abstract*—**A spherical multicomponent optical isolator having a first spherical segment lensing region, including a base, a second spherical segment lensing region, including a base, a first polarizer attached to the base of the first segment lensing region, a second polarizer attached to the base of the second spherical segment lensing region, and A Faraday rotator disposed between the first and second polarizers, wherein the combination of the first and second spherical segments, the first and second polarizers, and the Faraday rotator forms the spherical optical isolator having a spherical optical isolator having a spherical outer surface.

6 Claims, 3 Drawing Sheets



5,267,336 Nov. 30, 1993

Electro-Optical Sensor for Detecting Electric Fields

Inventors: S. S. Sriram, Stuart A. Kingsley, Joseph T. Boyd.
Assignee: Srico, Inc.
Filed: May 4, 1992.

***Abstract*—**The invention relates to an electric field sensor useful in detecting and measuring wideband transient electrical responses by means of an integrated optical waveguide interferometer. Mach–Zehnder devices are produced wherein one waveguide channel has been reverse poled, or has domain inversion, preferably by means of titanium diffusion into said waveguide channel. Also produced is an electrode-less optical interferometer modulator by which an optical output signal is modulated at the same frequency as an applied electric field.

30 Claims, 5 Drawing Sheets