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.

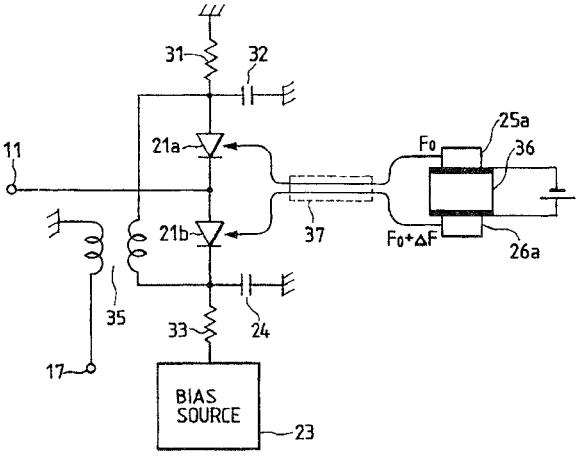
5,352,885 Oct. 4, 1994

Frequency Converter for Varying the Frequency of a Local Signal Over a Wide Band

Inventor: Shoji Niki.
Assignee: Advantest Corporation.
Filed: Feb. 24, 1993.

Abstract—An input signal of a frequency f_0 is supplied to one end of a photodiode. Optical signals of frequencies F_0 and $F_0 + \Delta F$ from two light sources are combined by a semi-transparent mirror and the resulting interference light is applied to the photodiode The interference light is converted by the photodiode to an electrical local signal of a frequency ΔF. The electrical local signal and the input signal are frequency mixed in accordance with the nonlinear characteristic of the photodiode and an intermediate-frequency signal of a frequency corresponding to the frequency difference between them is provided at an output terminal.

5 Claims, 2 Drawing Sheets



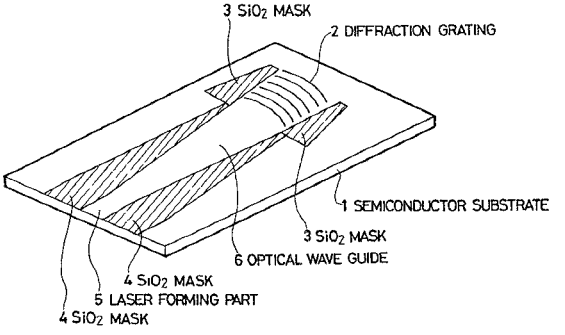
5,352,919 Oct. 4, 1994

Optical Integrated Semiconductor Device

Inventor: Shinji Takano.
Assignee: NEC Corporation.
Filed: Nov. 8, 1993.

Abstract—An optical integrated semiconductor device includes a semiconductor substrate, a diffraction grating formed on the semiconductor substrate, an optical waveguide layer deposited on the semiconductor substrate, and at least one of a light-emitting element and a light-detecting element formed on the semiconductor substrate. At least one of the thickness and refractive index of the optical waveguide layer has a value which varies depending on the position in the semiconductor substrate. The optical waveguide layer, the light-emitting element, and the light-detecting element are preferably formed by selective area growth employing vapor-phase epitaxy. The diffraction grating preferably has a constant period. Preferably, the semiconductor substrate is made of InP and the optical waveguide layer is made of $In_XGa_{1-X}As_yP_{1-Y}$ where X and Y have values ranging from 0 to 1.

4 Claims, 5 Drawing Sheets



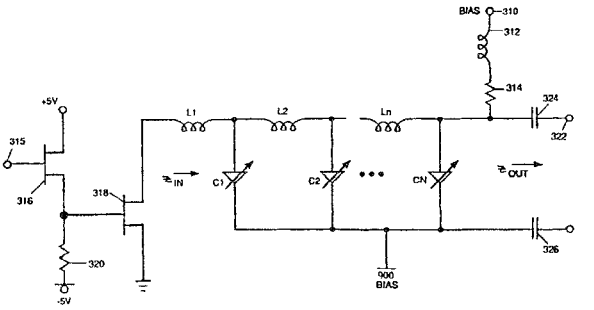
5,352,994 Oct. 4, 1994

Gallium Arsenide Monolithically Integrated Nonlinear Transmission Line Impedance Transformer

Inventors: Alistair D. Black, David M. Bloom, Robert A. Marsland, Mohammad S. Shakouri, Allen F. Podell.
Assignee: The Board of Trustees of the Leland Stanford Junior University.
Filed: May 1, 1991.

Abstract—A nonlinear impedance transformer comprising a plurality of scaled L-C sections. The first section has its inductance and capacitance values selected to establish a characteristic impedance approximately equal to the output impedance of the local oscillator. The last section has its inductance and capacitance values selected to establish an output impedance which substantially matches the input impedance of whatever device to which the nonlinear impedance transformer is coupled. The impedance of each section is scaled logarithmically between the values of the input and output impedances. An FET driver can be integrated on the same substrate as integrated versions of the nonlinear impedance transformer. In such a case, the input impedance of the first section is set to the output impedance of the FET, i.e., about 10 ohms.

32 Claims, 23 Drawing Sheets



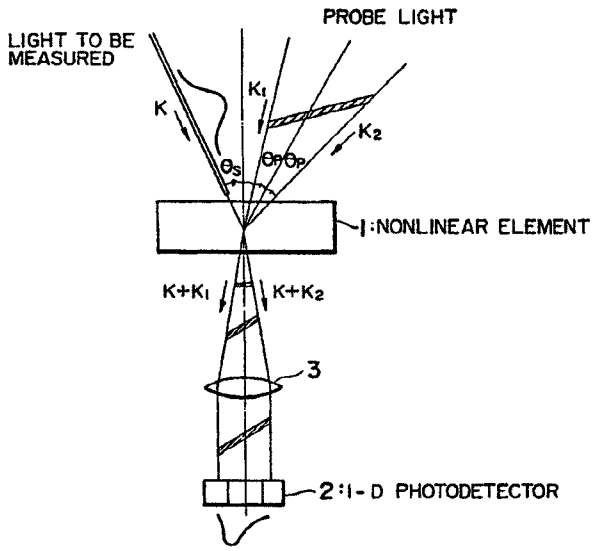
5,353,149 Oct. 4, 1994

Apparatus for Affecting Time-Space Conversion on a Light Signal Changing at Ultra-High Speed

Inventors: Tsuneyuki Urakami and Teruo Hiruma.
Assignee: Hamamatsu Photonics K.K.
Filed: Sept. 16, 1993.

Abstract—An optical converter is so arranged that light to be measured and probe light are made to interact with each other on a nonlinear element and that mixed light produced by the interaction is detected, which is characterized in that an energy amount of interacting signal light is kept as high as possible without spatial expansion of signal light, which could lower the SN ratio. For this, the time-space conversion function is achieved by a method for producing the probe light. Namely, the optical converter comprises 1) a nonlinear element for making two types of light interact with each other to cause the nonlinear optical effect; 2) a device for guiding light to be measured to the nonlinear element; and 3) a device for producing probe light crossing the light to be measured on the nonlinear element and changing a traveling direction of probe light with change of crossing time. A light waveform measuring apparatus or an optical serial-parallel converter may be attained by adding to the optical converter 4) a device for detecting mixed light produced by the interaction between the signal light and the probe light on the nonlinear element.

25 Claims, 11 Drawing Sheets



$\angle 1 = \theta_S$

$\angle 2 = \theta_P$

$\angle 3 = \theta_S - \theta_P$

$\angle 4 = \theta_D$

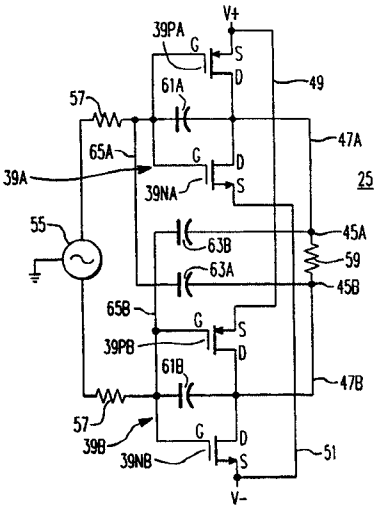
5,355,095 Oct. 11, 1994

Broadband Microwave Integrated Circuit Amplifier with Capacitive Neutralization

Inventors: Harvey C. Nathanson and Richard J. Ravas.
Assignee: Westinghouse Electric Corp.
Filed: Feb. 21, 1992.

Abstract—Push-pull complimentary MOSFET devices are formed in a thin active layer between the top surface of a high resistivity silicon wafer and a insulating layer implanted below the top surface. Each MOSFET is composed of a plurality of cells each having a source, a gate, and a drain region extending fully through the active layer. Grooves extending through the wafer are lined with vias which connect the source regions with a floating ground plane on the bottom of the wafer. The gates of all the cells are connected by a gate bus on the top surface. Air bridges spanning the gates and the source vias connect the drain conductors of each cell. Neutralizing capacitors connected between an input and an opposite output of the push-pull complimentary MOSFET devices match the parasitic capacitances of the devices and provide wide bandwidth amplification with roll off well into the GHz range without the need for tuning inductors.

6 Claims, 4 Drawing Sheets



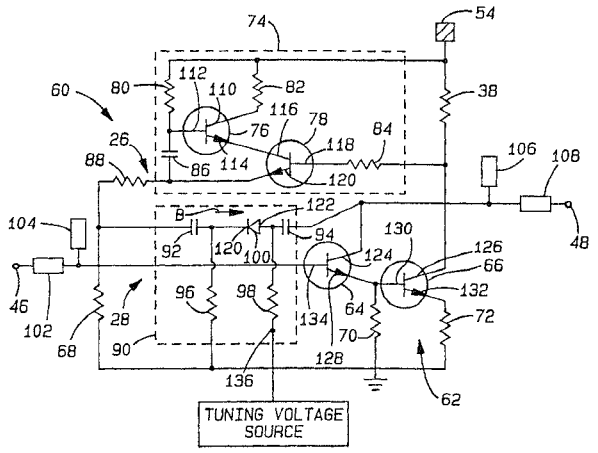
5,355,096 Oct. 11, 1994

Compace HBT Wide Band Microwave Variable Gain Active Feedback Amplifier

Inventor: Kevin W. Kobayashi.
Assignee: TRW Inc.
Filed: July 6, 1993.

Abstract—A variable gain amplifier includes a first transistor including a base, and an emitter, and a collector. A first parallel feedback device connected to the collector and the base of the first transistor provides an inductive impedance. A second parallel feedback device connected to the collector and the base of the first transistor provides a variable resistive impedance and includes a monolithically integrated p-i-n diode having a quiescent bias current flowing therethrough. The gain response of the first transistor is related to the variable resistive impedance of the second parallel feedback device.

12 Claims, 3 Drawing Sheets



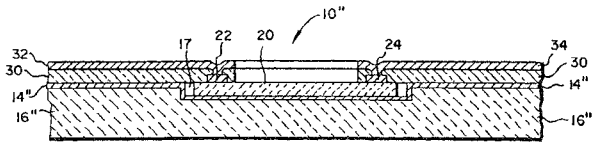
5,355,102 Oct. 11, 1994

HDI Impedance Matched Microwave Circuit Assembly

Inventors: William P. Kornrumpf, Robert J. Wojnarowski, Charles W. Eichelberger.
Assignee: General Electric Company.
Filed: Apr. 14, 1992.

Abstract—Active components of a microwave system are inter-connected on a substrate by a dielectric-overlay, high-density-interconnect structure in a manner which provides close impedance matching, minimizes impedance discontinuities, and substantially increases the yield of good circuits.

22 Claims, 5 Drawing Sheets



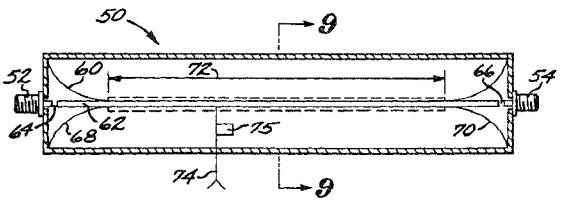
5,355,104 Oct. 11, 1994

Phase Shift Device Using Voltage-Controllable Dielectrics

Inventors: Ronald L. Wolfson, Clifton Quan, Donald R. Rohweller.
Assignee: Hughes Aircraft Company.
Filed: Jan. 29, 1993.

Abstract—A length of strip transmission line uses two symmetrically spaced center conductors between two ground-planes. These conductive strips produce an even-mode electric field between the two groundplanes when excited in-phase and an odd-mode electric field when excited in anti-phase relationship. For the latter case, the phase velocity of the odd-mode is significantly affected by the electric field in the gap region between the conducting strips. By varying the relative dielectric constant of a material located in the gap region, e.g., by means of a voltage-controllable dielectric such as barium-titanate compositions, the phase velocity and, hence, the phase shift of an RF signal propagating through the strip transmission medium can be controlled.

14 Claims, 5 Drawing Sheets



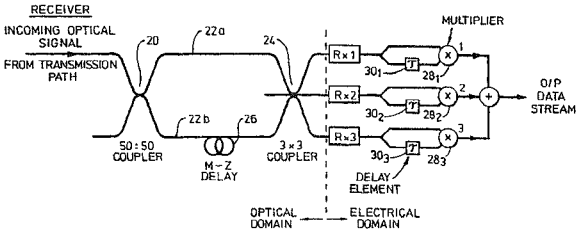
5,355,243 Oct. 11, 1994

Direct Detecting of Optical PSK Signals

Inventor: Jonathan P. King.
Assignee: Northern Telecon Limited.
Filed: Aug. 11, 1992.

Abstract—A self homodyne direct detection optical transmission system includes a transmitter in which binary data signals are converted into double differential phase shift keyed (DDPSK) optical signals. The receiver includes a two-path optical interferometer, having a path unbalance optical delay substantially equal to 1 bit period, to which received DDPSK signals are applied. The interferometer output is converted into a plurality of balanced phase diversity outputs. From each of the phase diversity outputs a replica of the binary data signals is recovered and the replica signals are combined to form an output binary data signal.

1 Claim, 4 Drawing Sheets



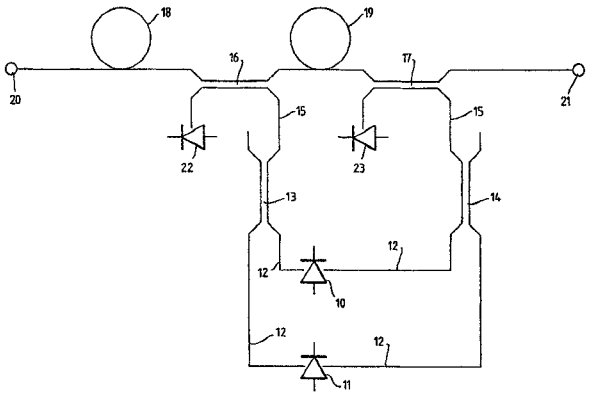
5,355,248 Oct. 11, 1994

Optical Amplifier

Inventor: Anagnostis Hadjifotiou.
Assignee: Northern Telecom Limited.
Filed: Oct. 29, 1993.

Abstract—A diode-pumped fiber amplifier has its amplifying fiber divided into two parts so that light from both ends of a laser diode can be used for pumping. A second diode may be included for redundancy, its outputs being coupled via a pair of polarization beam splitter/combiners.

4 Claims, 2 Drawing Sheets



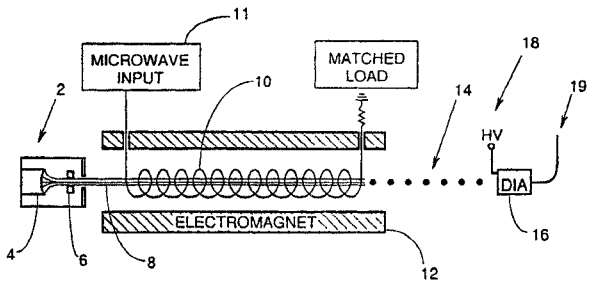
5,355,380 Oct. 11, 1994

Compact Millimeter Wave Source

Inventors: Shiow-Hwa Lin and Lawrence H. Sverorup, Jr.
Filed: Dec. 23, 1992.

Abstract—A millimeter wave device. Pulses of electrons illuminate a diamond switch at rates of 1 billion to 100 billion pulses per second. The diamond switch connects a high voltage source to a millimeter wave transmitter or other load. In preferred embodiments the electron pulses are provided by a klystron or a traveling wave tube.

3 Claims, 3 Drawing Sheets



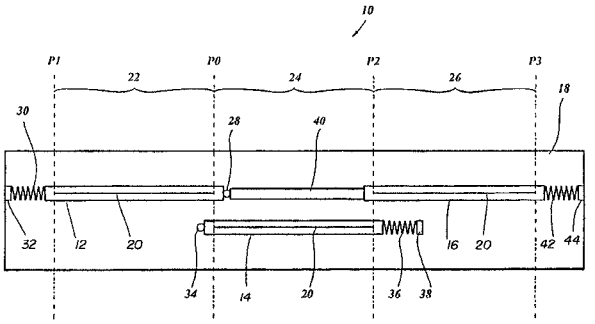
5,357,098 Oct. 18, 1994

Mounting Structure for Electro-Optical Devices

Inventor: Hans M. Van Gent.
Assignee: OCE-Nederland, B.V.
Filed: June 25, 1993.

Abstract—A scanning head is provided suitable for scanning large-size documents including a plurality of contact type CCD's staggered on a common substrate with overlapping end portions, so that their sensitivity ranges are adjoined to one another, adjacent ends of two CCD's being fixed on the substrate by stops, and the opposite ends of these CCD's being elastically supported to allow for thermal expansion or contraction, there being interposed between the first CCD and the third CCD a spacer which has a thermal expansion coefficient comparable to that of the CCD's so that the sensitivity ranges of the second and third CCD's are matched to one another, irrespective of the expansion or contraction of the second CCD.

5 Claims, 1 Drawing Sheet



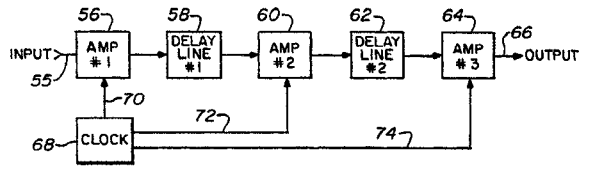
5,357,206 Oct. 18, 1994

Sequential Amplifier

Inventor: Darrell L. Ash.
Assignee: R.F. Monolithics, Inc.
Filed: Jan. 21, 1993.

Abstract—A sequential amplifier having at least two amplifier stages separated by a delay device such that a clock may control both stages to energize one while the other is de-energized, thus allowing a signal to be amplified by adjacent amplifier stages without the adverse effects of feedback associated therewith.

9 Claims, 3 Drawing Sheets



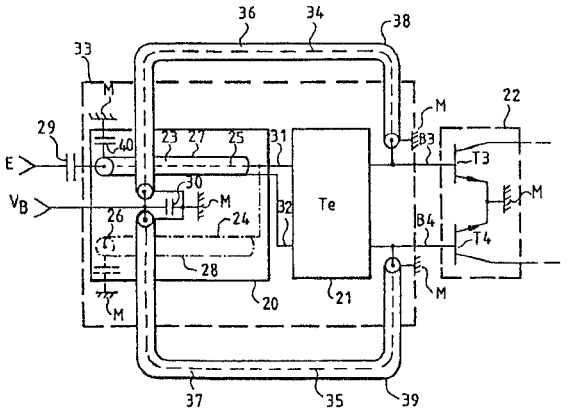
5,357,213 Oct. 18, 1994

High-Frequency Wide Band Amplifier Having Reduced Impedance

Inventors: Jean Michel, Jean-Claude Combe, Herminio de Faria.
Assignee: Thomson-Lgt Laboratoire General des Telecommunications.
Filed: Oct. 8, 1993.

Abstract—A high-frequency wideband power amplifier of the type comprising an amplifier stage with at least two transistors mounted as a differential stage, coupled at input and at output to a matching circuit further comprises, in order to convey each bias voltage to the amplifier stage, at least one high-frequency transmission line section with a length close to a quarter of the wavelength of the carrier of the signal to be amplified, the impedance of which, brought in parallel on each transistor, is negligible with respect to the high frequencies and the series impedance of which is negligible in the baseband of the signal to be amplified; the line sections conveying the bias voltages to the input of each transistor are identical to one another in length and in impedance, and the same is the case for the line sections conveying the bias voltages to the output of each transistor.

4 Claims, 3 Drawing Sheets



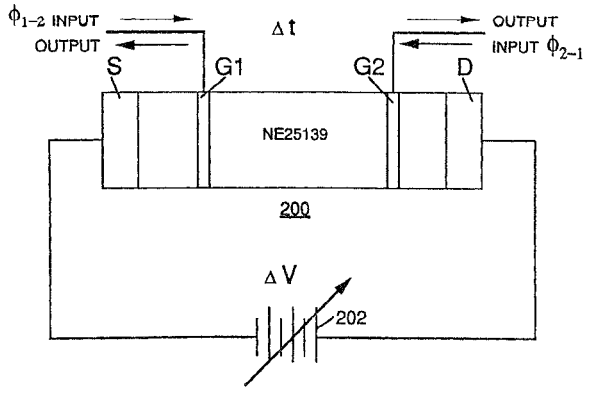
5,357,224 Oct. 18, 1994

Continuously Variable Monolithic RF and Microwave Analog Delay Lines

Inventor: Fred Sterzer.
Assignee: MMTC, Inc.
Filed: Aug. 5, 1993.

***Abstract*—The use of one or more multi-gate (e. g. dual-gate) FET's are employed in an RF or microwave delay line. The carrier drift velocity in each multigate FET is controlled in accordance with the variable magnitude of a delay-control voltage applied between its drain and source, thereby controlling the time delay experienced by an RF or microwave signal traveling between spaced first and second gates of a multigate FET The gates of a plurality of multigate FET's may be serially-coupled through amplifying circuits to produce a delay chain in which the total delay is the sum of the delays of all the multigate FET's in the chain. A single delay-control voltage, which can be continuously variable, may be used to control the total delay provided by all multigate FET's in the chain. Alternatively, a separate delay-control voltage, which can be independently continuously variable, may be used for independently controlling the delay provided by each individual multigate FET in the chain. RF and microwave analog delay lines are useful in such apparatus as difference-in-time-of-arrival direction finders and transversal filters, by way of example.**

14 Claims, 6 Drawing Sheets



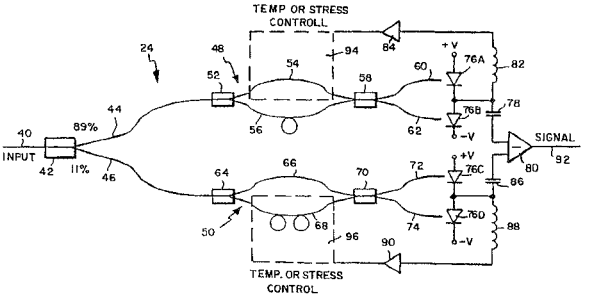
5,359,412 Oct. 25, 1994

Optical Frequency Discriminator Using Two Mach-Zehnder Interferometer Arrangement

Inventor: Peter A. Schulz.
Assignee: Massachusetts Institute of Technology.
Filed: Oct. 20, 1992.

***Abstract*—An optical frequency discriminator having enhanced linearity is provided that may be utilized in FM communications systems or in other applications. The discriminator has two interferometers with the optical path length difference for the first interferometer being ΔL and for the second interferometer being $m\Delta L$ where $m > 1$. The optical FM signal is applied in parallel to both optical interferometers with approximately m^3 times as much of the signal being applied to the first interferometer as to the second interferometer. Each interferometer has an output signal versus frequency characteristic with a substantially linear region about a center frequency that is approximately equal to the center frequency of the input optical signal. The outputs from the interferometers are combined in a manner such as the difference in absolute value of the linear region characteristic slopes is obtained, the resulting output being a discriminated output that is substantially linear over an enhanced FM range**

14 Claims, 3 Drawing Sheets



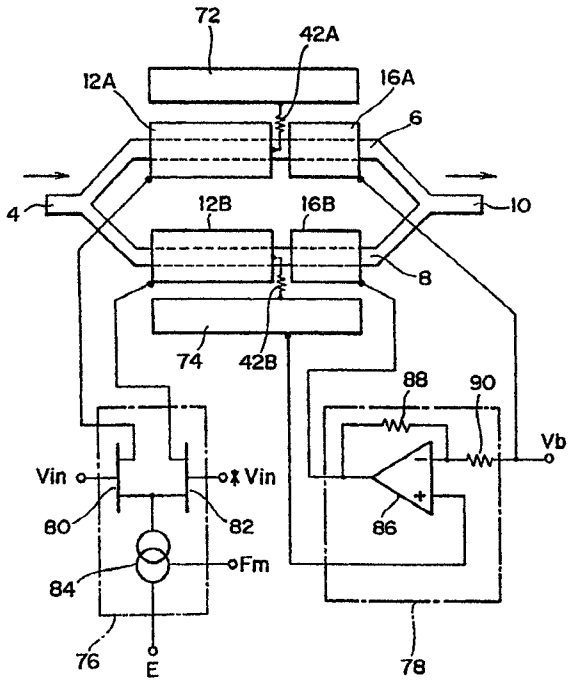
5,359,449 Oct. 25, 1994

Optical Modulator for an Optical Transmitter

Inventors: Hiroshi Nishimoto, Hironao Hakogi, Takatoshi Minami.
Assignee: Fujitsu Limited.
Filed: Nov. 19, 1992.

***Abstract*—An optical transmitter having a Mach-Zehnder optical modulator comprising a signal electrode fed with a driving signal for effecting modulation and a bias electrode for operating point control. Because the signal electrode and the bias electrode are independent of each other, a driving circuit and the signal electrode can be connected in a dc setup. This permits stable operating point control and improves waveform characteristics.**

23 Claims, 21 Drawing Sheets



5,359,451 Oct. 25, 1994

High Efficiency Acoustooptic Modulator

Inventors: Daniel Gelbart and Eviatar Halevi.
Assignee: Creo Products Inc.
Filed: Jan. 29, 1993.

Abstract—The efficiency of an acoustooptic modulator or deflector is increased by re-using the undiffracted beam, causing the same light beam to travel multiple times through the modulator. In order to maintain the bandwidth of the modulator, the multiple passes are made co-axial. A polarizing beam combiner and a waveplate are used to transmit the incoming beam but reflect the beam on the second pass. The gain in the efficiency of the modulator is particularly large for low efficiency modulators.

3 Claims, 1 Drawing Sheet