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.

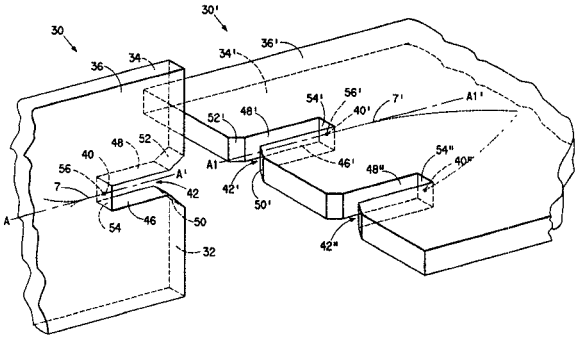
5,062,681 Nov. 5, 1991

Slot-Coupling of Optical Waveguide to Optical Waveguide Devices

Inventors: Robert J. Furmanak, Bruce L. Booth, and Thomas K. Foreman.
Assignee: E. I. Du Pont de Nemours and Company.
Filed: May 2, 1990.

Abstract—An optical waveguide device adaptable to be coupled with a similar optical waveguide device through commensurate slots on the devices, the slots guiding the ends of the respective waveguides into contact with each other, and into properly aligned optical coupling.

33 Claims, 10 Drawing Sheets



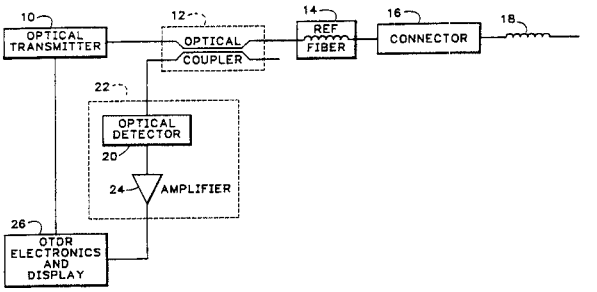
5,062,704 Nov. 5, 1991

Optical Time-Domain Reflectometer Having Pre- and Post-Front Panel Connector Testing Capabilities

Inventor: Glenn Bateman.
Assignee: Tektronix, Inc.
Filed: April 25, 1990.

Abstract—An improved optical time-domain reflectometer, OTDR, has a reference fiber interposed between an optical coupler and a front panel connector for acquiring a reference backscatter level that is independent from a fiber under test. The reference level is used to determine the quality of the front panel connection between the OTDR and the fiber under test and for verifying and adjusting transmitter and receiver circuitry in the OTDR. The reference fiber also allows the acquisition of front panel connector reflection data when a Bragg cell is used as the optical coupler.

5 Claims, 1 Drawing Sheet



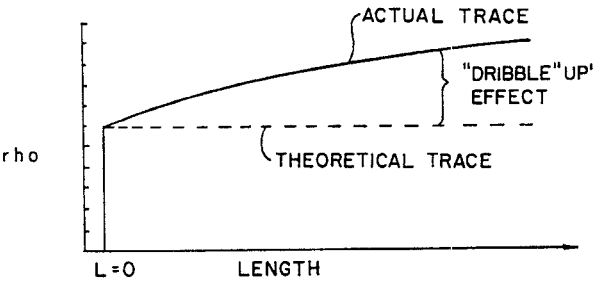
5,063,353 Nov. 5, 1991

Method for Accurate Measurement of Transmission Line Impedance by Correcting Gross Impedance for the "Dribble Up" Effect

Inventor: Roland W. Gublisch.
Assignee: Beckman Industrial Corporation.
Filed: Feb. 16, 1990.

Abstract—A method for measuring the impedance of a transmission line. The length and dc-loop resistance of the line are measured. A pulse is transmitted along the line, the pulse having a duration greater than the time required for it to propogate from its source to the end of the transmission line and reflect back to the source. The transmitted and reflected pulses are monitored and the resultant readings converted to a gross impedance measurement. The measurement is then corrected for the "dribble up" effect. The magnitude of the correction is a function of dc-loop resistance of the line. The corrected measurement is an accurate measurement of line impedance.

14 Claims, 1 Drawing Sheet



5,063,365 Nov. 5, 1991

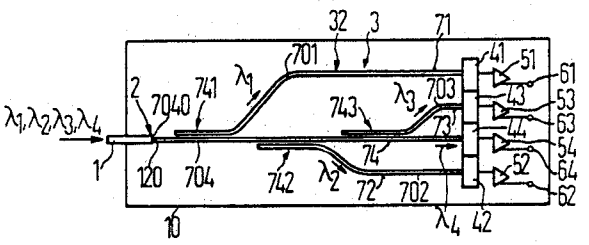
Microwave Stripline Circuitry

Inventor: Joseph D. Cappucci.
Assignee: Merrimac Industries, Inc.
Filed: Aug. 25, 1988.

Abstract—A broad-band microwave stripline magic tee designed for a center microwave frequency is disclosed. The magic tee includes a pair of 3-db quadrature couplers connected in tandem to one another through a 90°

differential phase shift circuit. Each of the 3-db quadrature couplers includes a first port, a second port, a third port and a fourth port. The 90° differential phase shift circuit includes first and second conductors therein having apparent electrical lengths that differ from one another by 270° at the microwave center frequency. The second port of the first coupler is serially connected through the first conductor of the phase shift circuit to the first port of the second coupler, and the third port of the first coupler is serially connected through the second conductor of the phase shift circuit to the fourth port of the second coupler, The first and fourth ports of the first coupler, and the second and third ports of the second coupler, serve as respective pairs of input and output ports of the magic tee, so that the application of a microwave input signal to one of the input ports results in output signals at the output ports that are of substantially equally amplitude and substantially in phase with one another, and the application of a microwave input signal to the other of the input ports results in output signals at the output ports that are of substantially equal amplitude and substantially 180° out of phase with one another. The magic tee has left-to-right symmetry so that the roles of the input and output ports can be reversed.

10 Claims, 3 Drawing Sheets



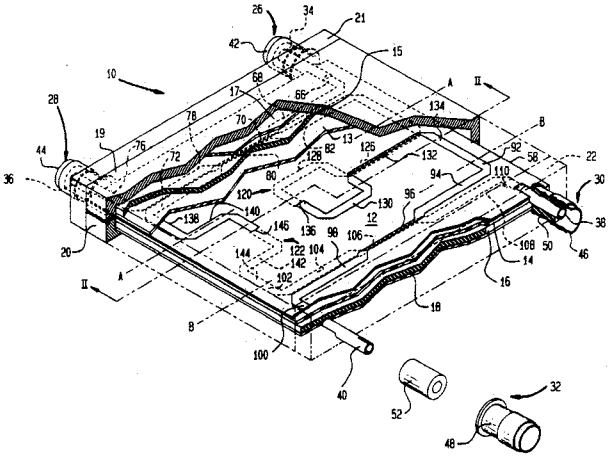
5,065,110 Nov. 12, 1991

Feed-Forward Amplifier Including Phase Correction

Inventors: Stephen Ludvik, Victor E. Steel, and Douglas Scott.
Assignee: Teledyne MEC.
Filed: May 2, 1990.

***Abstract*—**A feed-forward amplifier utilizes frequency dependent delay elements to cancel the effects of phase dispersion in the amplifier to amplify a broadband, high-frequency signal with low distortion.

5 Claims, 4 Drawing Sheets



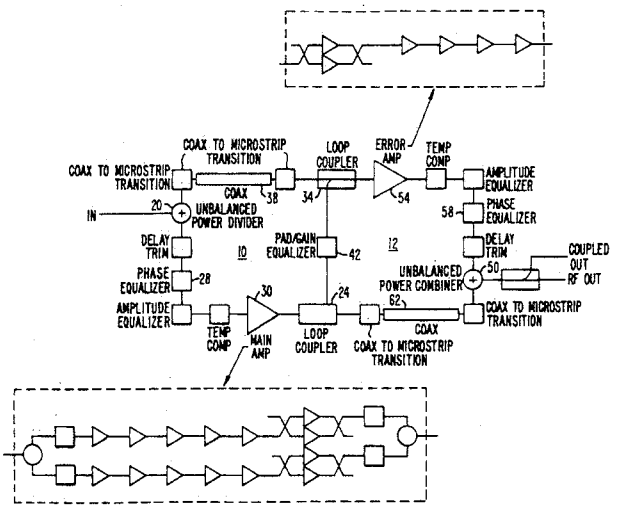
5,064,263 Nov. 12, 1991

Multiplexing Apparatus for the Direct Optical Reception of a Plurality of Optical Wavelengths

Inventor: Karl-Ulrich Stein.
Assignee: Siemens Aktiengesallschaft.
Filed: Feb. 9, 1990.

***Abstract*—**An apparatus for direct optical reception of a plurality of wavelengths that includes a substrate having a waveguide disposed thereon for conducting the wavelengths, a waveguiding wavelength demultiplexer being integrated on the substrate for spreading the wavelengths into separate channels extending to separate optoelectronic detectors that are preferably integrated on the substrate. The device further includes an integrated transmitter so the device is a bidirectional functional unit having both an integrated transmitter and integrated direct receiver.

11 Claims, 3 Drawing Sheets



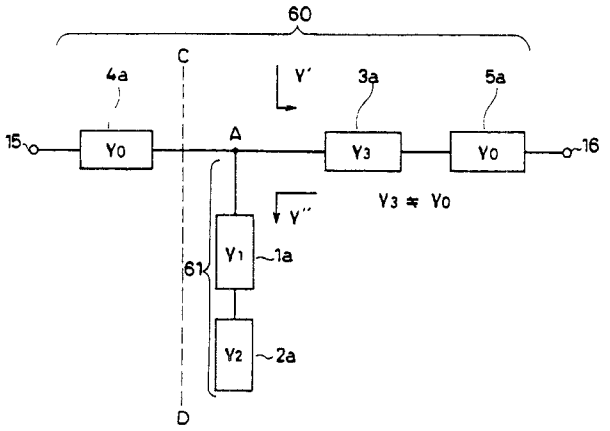
5,065,117 Nov. 12, 1991

Microwave Circuit

Inventor: Toshihiko Yoshimasu.
Assignee: Sharp Kabushiki Kaisha.
Filed: June 5, 1990.

***Abstract*—**Disclosed is a microwave circuit suitable made into a monolithic microwave integrated circuit (MMIC). This microwave circuit includes a main line comprising a distributed constant line formed on a major surface of a substrate, and a stub connected in parallel with the main line in which lines the characteristics admittance varies discontinuously. Because of the discontinuous variation of the characteristic admittance of the stub, the phase of the characteristic admittance is changed, so that the stub length can be reduced.

3 Claims, 10 Drawing Sheets



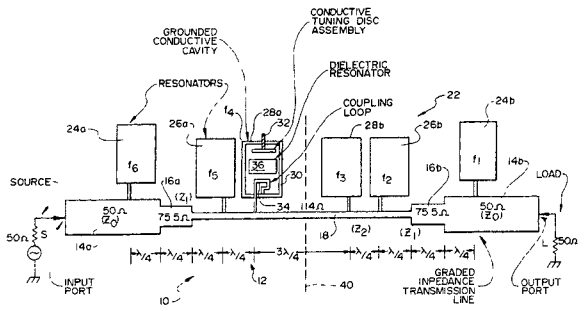
5,065,119 Nov. 12, 1991

Narrow-Band, Bandstop Filter

Inventor: Douglas R. Jachowski.
Assignee: Orion Industries, Inc.
Filed: Mar. 2, 1990.

***Abstract*—A multiresonant notch filter incorporates a stepped impedance transmission line with impedance values going from a relatively low value and increasing upward to a relatively high value then back down to a relatively low value again. A plurality of resonant cavitites is coupled to the relatively high central impedance line section of the filter. Other resonators can be coupled to lower impedance sections of the transmission line.**

22 Claims, 10 Drawing Sheets



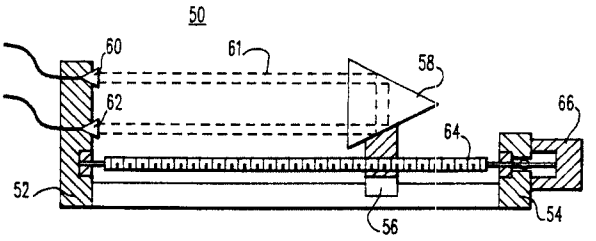
5,066,066 Nov. 19, 1991

Optical Variable Delay Line and Variable-Frequency Fiber-Optic Multiplexer

Inventors: David K. Davies, Peter J. Chantry, and Anastasios P. Goutzoulis.
Assignee: Westinghouse Electric Corp.
Filed: Aug. 27, 1990.

***Abstract*—A fiber-optic coupled, free-space variable delay line is provided wherein the phase adjustment of the signal can be accurately set. A microscope-objective lens collimates a signal beam which is received by a focusing lens. The focusing lens is provided on an adjustable carrier to allow one to accurately adjust the distance travelled by the collimated signal base and thereby accurately adjust the off-set. A plurality of these variable delay lines can be arranged to form a multiplexer. If the threads on each drive rod moving a carrier are different, the carrier can be adjusted to accommodate changes in frequency of the signal.**

10 Claims, 3 Drawing Sheets



5,066,086 Nov. 19, 1991

Semiconductor Device Comprising a Directional Coupler for the TE and TM Components

Inventors: Johannes Angenent and Jean A. Cavailles.
Assignee: U. S. Philips Corp.
Filed: July 20, 1990.

***Abstract*—An integrated semiconductor device including a directional optoelectronic coupler, which coupler comprises two parallel single-mode rectilinear optical waveguides over a total length D, separated by a small distance d, which coupler also comprises four electrodes of the same conductivity type, two on each waveguide, and at least one other electrode of the opposite conductivity type, characterized in that the coupler has an operation that is independent of the transverse electrical and transverse magnetic radiation components. TE and TM, respectively, present in random proportions in the incoming signal, under the condition in which the structural parameters of the coupler render it possible to ensure that the following relations are true:**

$$Z = D/2 \quad \text{(a)}$$

$$\phi_{\mathrm{TE}} \cdot L_{\mathrm{CTE}} = \phi_{\mathrm{TM}} \cdot L_{\mathrm{CTM}} \quad \text{(b)}$$

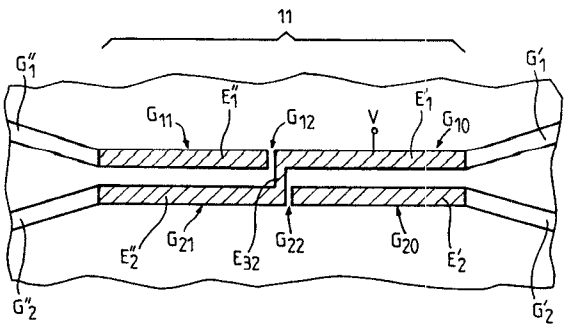
$$L_{\mathrm{CTM}}/L_{\mathrm{CTE}} = (1 - m/n)/\epsilon = k \quad \text{(c)}$$

$$D/L_{\mathrm{CTM}} = \left[p\sqrt{8}/(1 - \epsilon k)\right]\{1/|\sin[p \cdot \pi/(1 - \epsilon k)]|\}. \quad \text{(d)}$$

in which relations:

- Z is the dimension of each electrode on the waveguides,
- ϕ_{TM} and ϕ_{TE} are the phase mismatches provoked by the refractive-index changes in the waveguides under the influence of an electric field,
- L_{CTE} and L_{CTM} are the coupling lengths for TE and TM, respectively,
- m, n, p are random integer numbers,
- $\epsilon = \pm 1$.

10 Claims, 16 Drawing Sheets



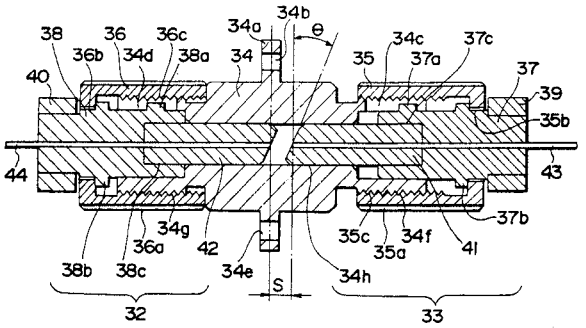
5,066,094 Nov. 19, 1991

Variable Optical Fiber Light Attenuator

Inventor: Mitsuo Takahashi.
Assignee: Seikoh Giken Co., Ltd.
Filed: Feb. 7, 1991.

Abstract—A variable light attenuator of optical connector type. It consists of an alignment adapter, first ferrule fastening means, and second ferrule fastening means. The alignment adapter provides an alignment through hole concentrically passing therethrough along the optical axis thereof. First ferrule fastening means fastens first ferrule whose edge is exposed to an intermediate air gap and is 7° or more inclined to a plane perpendicular to the optical axis, passes the first ferrule through the alignment through hole, and fastens the first ferrule to the alignment adapter. Second ferrule fastening means fastens second ferrule that is almost the same as first ferrule fastening means in both structure and functions, but movable along the optical axis to appropriately set the gap between the first and second ferrules while the edges of the first and second ferrules are kept in parallel by key pin and key groove to specify the designated attenuation.

9 Claims, 5 Drawing Sheets



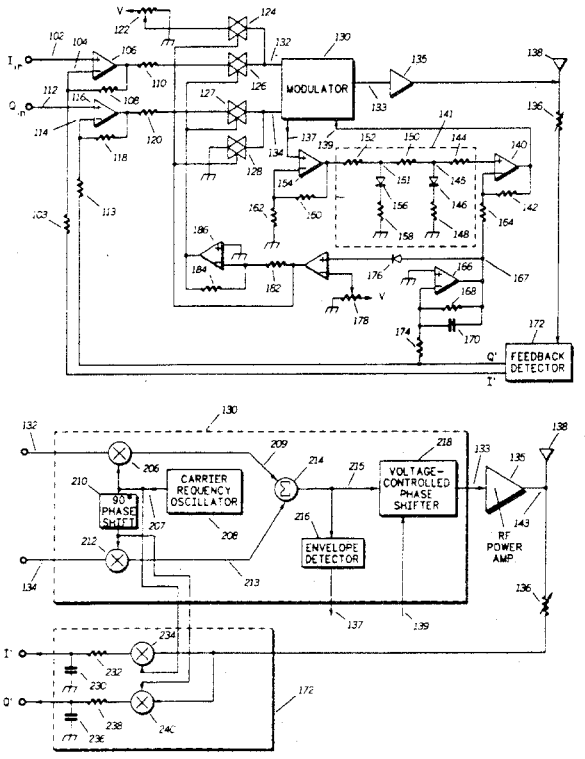
5,066,922 Nov. 19, 1991

Stabilizing Circuit for Feedback RF Amplifier

Inventor: Clifford D. Leitch.
Assignee: Motorola, Inc.
Filed: Apr. 18, 1991.

Abstract—A transmitter, with an inphase input for receiving an inphase baseband input signal, and a quadrature input for receiving a quadrature baseband input signal, comprises a modulator, coupled to the inphase and quadrature inputs, for modulating the inphase and quadrature baseband signals to provide a modulated radio-frequency signal and a linear amplifier, coupled to the modulator, for amplifying the modulated radio-frequency signal to produce an output signal. Oscillation detector means are coupled to receive the output signal, for detecting oscillation, and for producing an error signal as a result of the oscillation. The transmitter also comprises means for reducing the open-loop gain of the feedback loop, disposed between the inphase and quadrature inputs and the modulator. The means for reducing the open loop gain reduces the open-loop gain of the transmitter to less than one, in response to the error signal.

12 Claims, 4 Drawing Sheets



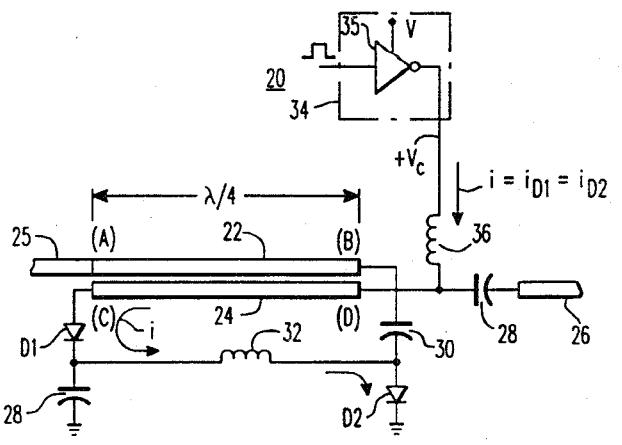
5,066,930 Nov. 19, 1991

High-Efficiency Diode Phase Shifter

Inventor: Alfred W. Morse.
Assignee: Westinghouse, Electric Corp.
Filed: Oct. 22, 1990.

Abstract—In one embodiment, a diode phase shifter has a four-port coupler formed of a pair of RF-coupled transmission lines. The coupler has an input port on one transmission line and an output port on the other, and each transmission line has a tunable port. Serially interconnected RF-isolated gateable diodes are provided, one diode is coupled to the tunable port on one transmission line and the other diode is connected to the other tunable port. The diodes approximate a microwave open circuit when reverse biased and approximate a microwave short circuit when forward biased to a conducting state. In another embodiment a diode phase shifter employing a single stripline is described.

17 Claims, 3 Drawing Sheets



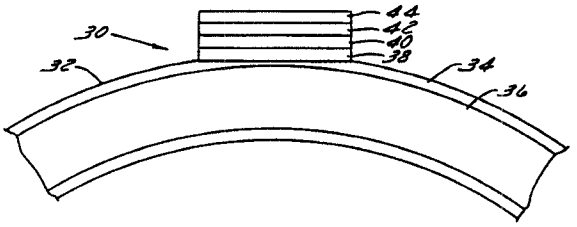
5,067,788 Nov. 26, 1991

High-Modulation Rate Optical Plasmon Waveguide Modulator

Inventors: Tomasz P. Jannson, Joanna L Jannson, and Behzad Moslehi.
Assignee: Physical Optics Corporation.
Filed: Mar. 21, 1991.

Abstract—A high-speed light modulator employing surface plasmon wave coupling comprises a metal-dielectric interface positioned adjacent to and externally of a waveguide carrying totally internally reflected light waves. A high-frequency voltage applied to the interface causes the dielectric, in the preferred case an ultra-fast electrooptic polymer, to resonate, generating a surface plasmon wave at the interface. The plasmon wave couples with the evanescent wave portion of the light waves in the waveguide. The output intensity of the light waves varies inversely with the strength of coupling between the light wave and surface plasmon wave modes. The modulator eliminates bulk and alignment problems associated with state of the art modulators and can be employed in integrated optic circuits.

12 Claims, 4 Drawing Sheets



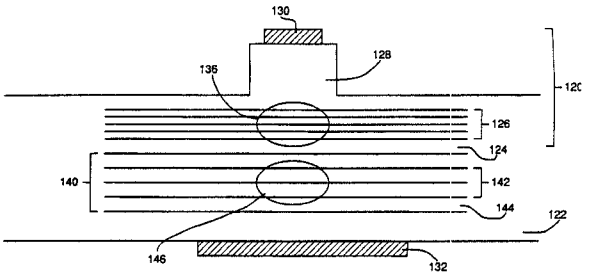
5,067,828 Nov. 26, 1991

Transferred Electron Effective Mass Modulator

Inventors: Gerard J. Sullivan, Kenneth D. Pedrotti, and Herbert Kroemer.
Assignee: Rockwell International Corporation.
Filed: Aug. 9, 1990.

Abstract—An optical modulator having a waveguide region comprising first and second layers of material having differing effective masses for free charge carriers at a predefined band edge energy disposed immediately adjacent to each other and covered by a lower refractive index cladding. A preferred embodiment employs a semiconductor system such as $Al_yGa_{1-y}As$ for the first and second material layers with the value of y adjusted between the layers so that the conduction band edge energies of the direct band in one layer is about the same as that of the indirect condition band in the other layer. A mechanism is provided for moving charge carriers between the first and second layers, such as metal contacts and a power source for applying electrical fields to the waveguide structure in a desired modulation pattern. The material layers may be deposited as a series of quantum wells with limited disordering or a ridge structure used to obtain lateral confinement. In addition, the optical modulator can comprise a photodetector or a second control waveguide positioned adjacent to the waveguide region and electrically connected to the waveguide to alter electrical fields applied to the waveguide in response to optical signals.

18 Claims, 8 Drawing Sheets



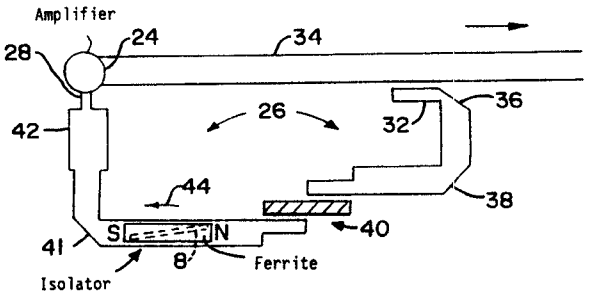
5,068,627 Nov. 26, 1991

Narrow-Band Microstrip Isolator

Inventors: Richard W. Babbitt, Adam Rachlin, and Thomas E. Koscica.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Nov. 19, 1990.

Abstract—A resonant microwave isolator is described in which a diagonal slot is formed in the top conductor of a microstrip, a strip of ferromagnetic material is mounted over at least a portion of the slot and magnetic flux is established in the ferromagnetic material in a direction intersecting the slot.

14 Claims, 5 Drawing Sheets



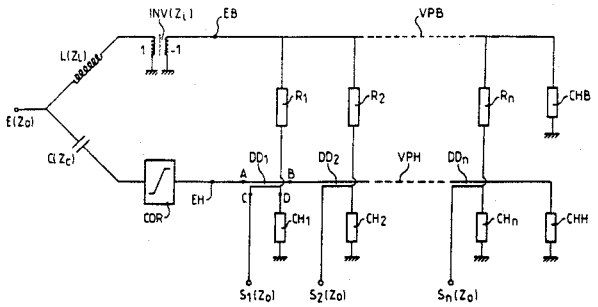
5,068,630 Nov. 26, 1991

Multiple Coupler Device with Return Path

Inventor: Joël Gris.
Assignee: U. S. Philips Corp.
Filed: Dec. 14, 1989.

Abstract—A multiple coupler which comprises a low-pass path (VPB) and a high-pass path (VPH) and frequency separation elements comprising a capacitive element C and an inductive element L, whose impedances Z_c and Z_L, respectively, satisfy the relation $Z_cZ_l = Z_{o^2}$. The low-pass path comprises a phase inverter INV to enable recombination of the signals without any distortion.

23 Claims, 3 Drawing Sheets



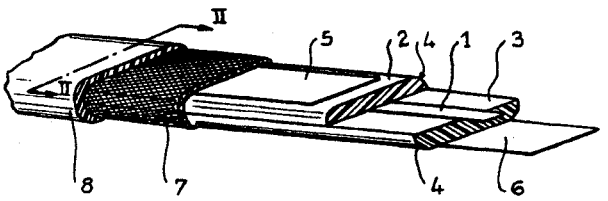
5,068,632 Nov. 26, 1991

Semirigid Cable Designed for the Transmission of Microwaves

Inventor: André Champeau.
Assignee: Thomson-CSF.
Filed: Dec. 15, 1989.

Abstract—A semirigid cable for the transmission of microwaves, such as those used for radar or for digital television. This cable has a symmetrical strip line with a dielectric having an almost rectangular section, with a width close to the thickness of the dielectric and external conductive strips with a width that is substantially greater than that of the central conductor. This symmetrical strip line is advantageously surrounded by an absorbent sheath. The entire unit is protected by an ordinary metallic shielding and by a standard external mechanical protective sheath.

7 Claims, 2 Drawing Sheets



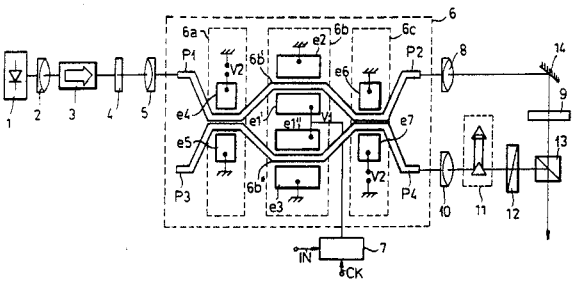
5,069,520 Dec. 3, 1991

High-Speed Modulator of the Polarization of an Optical Carrier

Inventors: Riccardo Calvani, Renato Caponi, and Giuseppe Marone.
Assignee: Centro Studi e Laoratori Telecomunicazioni S.p.A.
Filed: Jan. 19, 1990.

Abstract—The modulator comprises an integrated optical switch (6) receiving at an input a linearly-polarized optical carrier and transferring same to a first or a second output (P3, P4), according to the logic values of the bits of a modulating binary data signal. The radiations outgoing from the switch are sent to a polarizing beam splitter (13) with their original polarization or with a polarization rotated by 90° depending on the switch output (P3, P4) from which they come. A signal with the original polarization rotated by 90° is present at the splitter output, depending on the logic values of the bits of the modulating signal.

18 Claims, 3 Drawing Sheets



5,069,561 Dec. 3, 1991

Monolithically Integrated Ridge Waveguide Semiconductor Optical Preamplifier

Inventors: William C. Rideout, Roger P. Holmstrom, Elliot Eichen, William Powazinik, Joanne LaCourse, John Schlafer, and Robert B. Lauer.
Assignee: GTE Laboratories Incorporated.
Filed: July 24, 1990.

Abstract—A monolithically integrated optical preamplifier comprises an amplifying region, an optical detection region for detecting amplified light, and an optically transparent and electrically insulating isolation region interposed between the amplifying and optical detection regions. The amplifying region achieves reduced facet reflectivity by being designed to have a large spot size, single-traverse mode waveguide amplifier oriented at an angle with respect to a crystal plane through the preamplifier. The isolation region is preferably an air gap.

12 Claims, 2 Drawing Sheets