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.

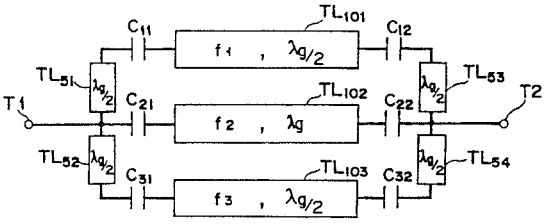
5,184,096 Feb. 2, 1993

Parallel Connection Multi-Stage Band-Pass Filter Comprising Resonators with Impedance Matching Means Capacitively Coupled to Input and Output Terminals

Inventors: Kikuo Wakino, Toshio Hishikawa, Youbei Ishikawa, Koichi Takehara, and Toru Tanizaki.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Aug. 27, 1991.

Abstract—A parallel connection multi-stage band-pass filter including an input terminal and an output terminal for signals, a plurality of resonators respectively having resonator frequencies different from and close to one another which are electrically connected in parallel to each other between said input and output terminals.

9 Claims, 17 Drawing Sheets



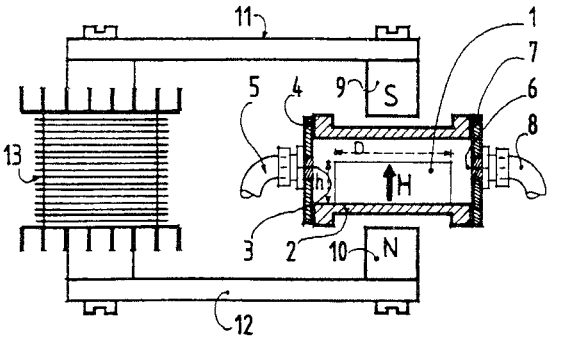
5,184,097 Feb. 2, 1993

Agile Microwave Filter Having at Least One Ferrite Resonator

Inventors: Carole Brouzes, Claude Ressencourt, and Alain de Place.
Assignee: Alcatel Transmission par Faisceaux Hertziens.
Filed: Feb. 15, 1991.

Abstract—An agile microwave filter tunable by ferrite is constituted as a filter having dielectric confinement resonators and as a result comprises an evanescent mode waveguide and resonant cylinders placed in the waveguide. In addition, the cylinders are made of ferrite and means are provided for applying an adjustable magnetic field thereto, thereby enabling the center frequency of the filter to be shifted.

2 Claims, 2 Drawing Sheets



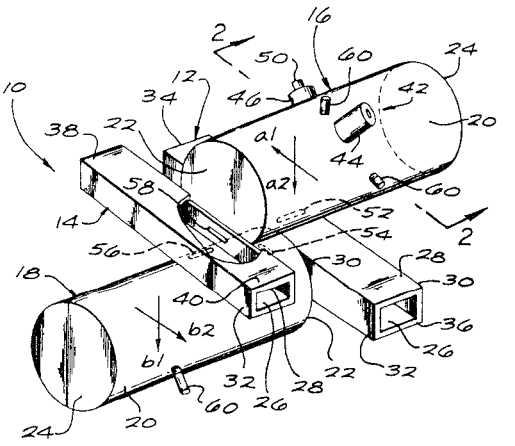
5,184,098 Feb. 2, 1993

Switchable Dual Mode Directional Filter System

Inventors: Rolf Kich and Paul J. Tatomir.
Assignee: Hughes Aircraft Company.
Filed: Feb. 10, 1992.

Abstract—A switchable dual mode directional filter system includes two identical filters coupled to input and output waveguides at the same plane in phase quadrature. Each waveguide has two ports through which the signal enters and exists. One of the filters has a switching device incorporated therein for selecting the desired output port. One embodiment of the switching device includes a pair of coupling members that extend radially inward within the cavity of the filter toward a central axis. These coupling members define two coupling positions for the system. Solenoids move the two coupling members into and out of the cavity of the filters. Only one coupling member is used at a given time. This switching device is designed to change the polarity of one of the components of the signal wave to change its wave characteristics in the output waveguide. As a result, the desired port of the output waveguide can be selected easily.

10 Claims, 4 Drawing Sheets



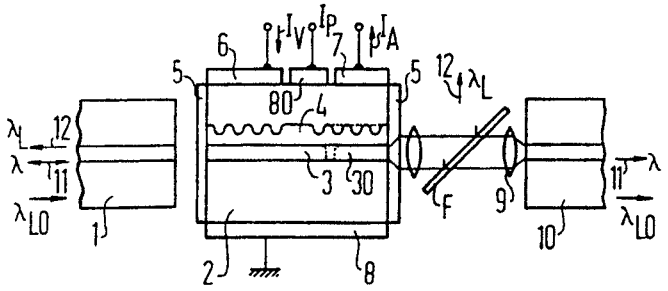
5,184,247 Feb. 2, 1993

Optically Stabilized Feedback Amplifier

Inventor: Robert Schimpe.
Assignee: Siemens Aktiengesellschaft.
Filed: July 17, 1990.

Abstract—An arrangement for operation as an optical feedback amplifier which is composed of a DFB laser whose grating selects a wavelength that differs by so much from the wavelength at which the amplification medium has a maximum gain that a constant amplification effect at this beamed-in wavelength is achieved by a progressive quenching of the emission of this wavelength selected by the grating given external optical irradiation via a coupled waveguide of light having a wavelength in the proximity of the wavelength of the gain maximum of the amplification medium.

20 Claims, 4 Drawing Sheets



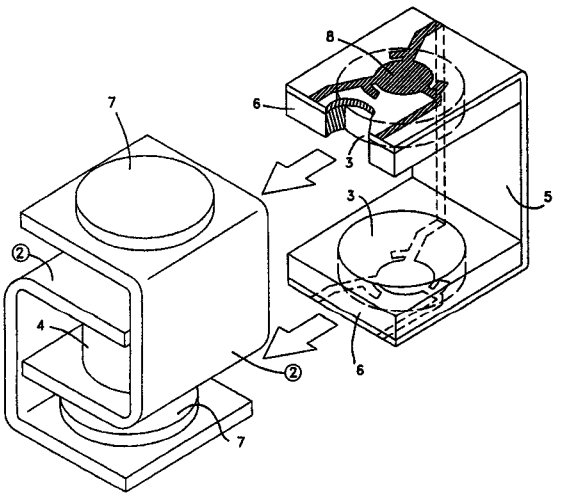
5,185,587 Feb. 9, 1993

Compact Tandem Non-Reciprocal Circuit

Inventors: Thampy Kurian and Leo Maloratsky.
Assignee: Renaissance Electronics Corp.
Filed: June 17, 1991.

Abstract—A compact multi-junction ferrite circulator/isolator in which ferrites, junctions with center conductors and permanent magnet are situated in a stacked manner with common center line within non-magnetic housing. A magnetic circuit also has C-shaped members each having shield, return and ground plane portions. The permanent magnet is located in between the ground plane portions of two C-shaped members. In this tandem circuit one permanent magnet and two ferrites having cross section area of those in a single circuit and less expensive round ferrite shape might be used. It gives a uniform magnetic flux which, in turn, provides better tandem circuit properties. The stacked situation of all principal tandem circuit members also gives the best horizontal integration. Vertical portion of a dielectric film within the tandem circuit might be used for a communication line application, for example, for amplifier giving the highest level of integration.

5 Claims, 3 Drawing Sheets



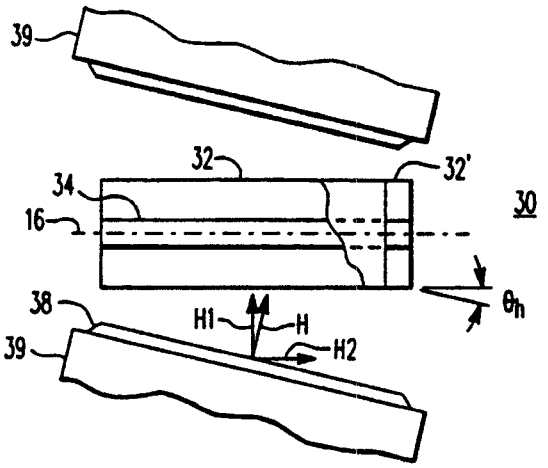
5,185,588 Feb. 9, 1993

Frequency Selective Limiter with Flat Limiting Response

Inventors: William E. McGann, Thomas E. Steigerwald, and John D. Adam.
Assignee: Westinghouse Electric Corp.
Filed: Feb. 21, 1991.

Abstract—The invention is directed to an FSL in which a pair of planar ferrite members have planar surfaces in confronting relationship and at least one signal carrying conductor is supported between the ferrites and is closely coupled thereto. A magnetic biasing field is established having field lines disposed at an angle relative to the conductor such that the FSl has an increased attenuation at low frequencies resulting in a relatively flat limiting characteristic across the bandwidth. The conductor may lie in a plane parallel to the field lines or transverse to the field lines. In one embodiment the conductor zigzags in the plane of the field.

13 Claims, 2 Drawing Sheets



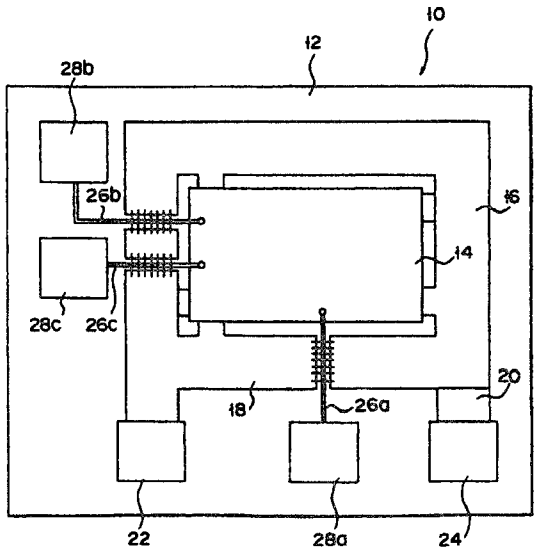
5,185,650 Feb. 9, 1993

High-Speed Signal Transmission Line Path Structure for Semiconductor Integrated Circuit Devices

Inventors: Hirotsugu Wakimoto, Mitsuo Konno, and Kunio Yoshihara.
Assignee: Kabushiki Kaisha Tobisha.
Filed: Apr. 1, 1992

Abstract—A high-speed semiconductor integrated circuit device has a main circuit section formed on a substrate, and a capacitance section formed on the substrate to surround the main circuit section. The capacitance section is made up of two conductive layers, an upper layer being insulatively disposed above a lower layer. These layers are applied with a power source voltage and a ground voltage, respectively. High-speed signal lines insulatively traverse the capacitance section and are connected to the main circuit section. The capacitance section is disconnected in the region where each signal transmission line passes, and defines a micro-strip type signal transmission line path structure. A "ladder"-shaped connection pattern is provided at each disconnected portion of the capacitance section, for electrically connecting a conductive layer arranged on one side of the disconnected portion to the corresponding layer arranged on the other side of the disconnected portion. The ladder-shaped connection pattern includes first and second parallel connection portions which extend at right angles to their corresponding signal transmission line. The impedance of the signal transmission line can be controlled by altering the horizontal pattern of the connection portions.

16 Claims, 4 Drawing Sheets



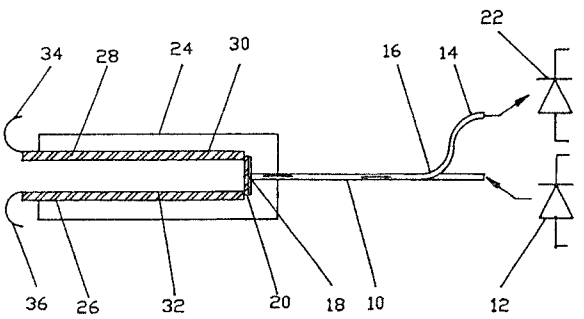
5,185,675 Feb. 9, 1993

Electro-Optic Modulator Systems for Fiber Optic Information Transmission

Inventor: Frank J. Banks.
Assignee: Moog, Inc.
Filed: Nov. 27, 1989.

Abstract—A system for transducing a signal voltage into an optical signal, transmitting the optical signal via an optical fiber to a remote location in the form of light attenuation frequency and interpreting the light frequency at the remote location to the amplitude and wave form of the signal voltage. The electro optic modulator includes an elongated piezoelectric member which changes length when an electric field is imposed across it., A mirror is attached to a free end of the piezoelectric member and strains or alternately moves toward and away from a partially reflecting surface at the end of an adjacent optical fiber. Light is introduced into the fiber with a portion reflected back by the movable mirror and part by the end of the fiber. A detector at the second end of the optical fiber receives the reflected light. As the movable mirror is moved in response to voltage changes, the phase changes between the light reflected into the optical fibers from the movable mirror will correspondingly vary with that reflected by the end of the fiber resulting in a light signal corresponding in amplitude and frequency to the original voltage signal The photo detector at the second end of the fiber converts the optical signal back to a voltage signal.

7 Claims, 1 Drawing Sheet



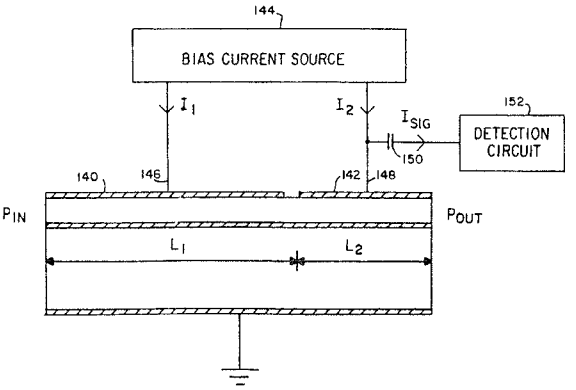
5,185,756 Feb. 9, 1993

Wideband Optical Amplifier–Receiver Utilizing Two Electrode Optical Amplifier

Inventors: Robert Olshansky and Kwang-Tsai Koai.
Assignee: GTE Laboratories Incorporated.
Filed: June 6, 1991.

Abstract—A semiconductor optical amplifier is utilized for optical amplification and for detection of an optical signal at the current injection electrode of the optical amplifier. A wide detection bandwidth is provided by utilizing an impedance transformer between the current injection terminal and the detection circuit. The impedance transformer typically has an input impedance of about 1 to 15 ohms. The impedance transformer can be a bipolar junction transistor circuit, a microstrip transmission line impedance transformer or a hybrid impedance transformer. A wide detection bandwidth is also obtained by providing a semiconductor optical amplifier having two current injection electrodes. A bias current is supplied through both current injection electrodes, and both electrodes produce optical gain. However, only one of the electrodes is used for optical signal detection. The detection electrode has a relatively high junction resistance and a relatively high series resistance.

21 Claims, 10 Drawing Sheets



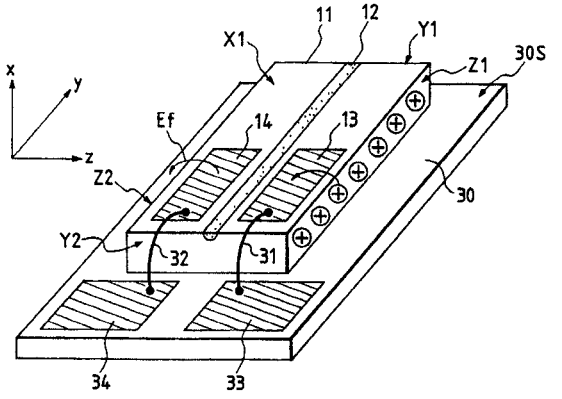
5,185,823 Feb. 9, 1993

Waveguide Type Optical Device

Inventors: Ryoji Kaku, Kiroyuki Takahashi, and Eiichi Asami.
Assignee: Japan Aviation Electronics Industry Limited.
Filed: Dec. 9, 1991.

Abstract—In a waveguide type optical device which has an optical waveguide and modulation electrodes for varying its refractive index, both formed in the top of a substrate and a ferroelectric crystal having a pyroelectric effect, the top of the crystal substrate being parallel to the direction of its spontaneous polarization, conductive films are formed in two surfaces of the crystal substrate which cross the direction of the spontaneous polarization. The conductive films are electrically interconnected to thereby prevent a change in the operating temperature characteristic of the optical device which is caused by the pyroelectric effect of the crystal substrate.

6 Claims, 3 Drawing Sheets



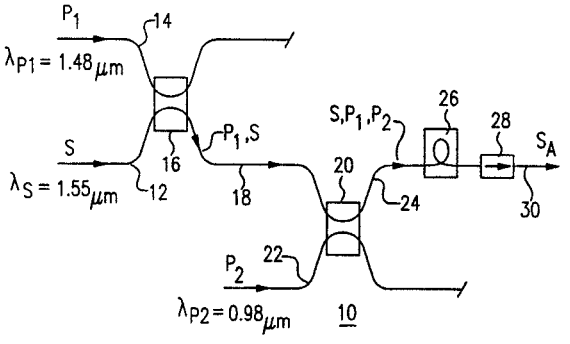
5,185,826 Feb. 9, 1993

Hybrid Pumping Arrangement for Doped Fiber Amplifiers

Inventor: Jean-Marc P. Delavaux
Assignee: AT&T Bell Laboratories.
Filed: Feb. 7, 1992.

Abstract—A hybrid pumping scheme for rare-earth doped fiber amplifiers is disclosed. In particular, the arrangement utilizes at least two pump sources, operating at different wavelengths, coupled to a section of doped optical fiber, such as erbium-doped optical fiber. Optical multiplexers, such as fused fiber couplers, may be used to couple the message signal desired to be amplified, as well as the pump sources, to the doped fiber section. For certain embodiments, the doped fiber may be segmented into separate components, with the length of each component determined with respect to the wavelength of the associated pump signal.

11 Claims, 3 Drawing Sheets



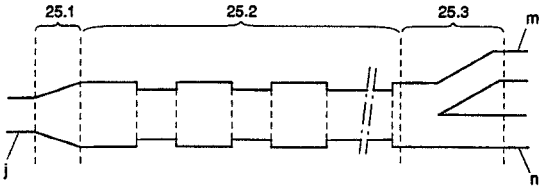
5,185,828 Feb. 9, 1993

Optical Waveguide (TE, TM) Mode Converter

Inventor: Johannes J. G. M. van der Tol.
Assignee: Kominklijke PTT Nederland N.V.
Filed: May 8, 1992.

Abstract—Mode converter for converting a fraction of one guided mode of an optical signal in an incoming optical waveguide section (A) into another guided mode in an outgoing wave-guiding section (C) by means of a periodic coupling between both guided modes in an intermediate optical waveguide section (B). The intermediate section (B) has a periodic geometrical structure as a result of an N-fold periodic sequence of two light-guiding subsections (P, Q) within a period length ($L_P + L_Q$.) The sequence can be obtained by arranging for the waveguide profiles of the subsections to differ from one another, preferably as a result of differences in width. The sequence can also be obtained by offset joining of the two subsections with the same waveguide profiles. Advantages are the high degree of integrability, the ability to co-integrate a laser light source in an optical section of a coherent optical receiver and the achievement of a new integrated design of such an optical section, which design is free of metallized elements.

27 Claims, 3 Drawing Sheets



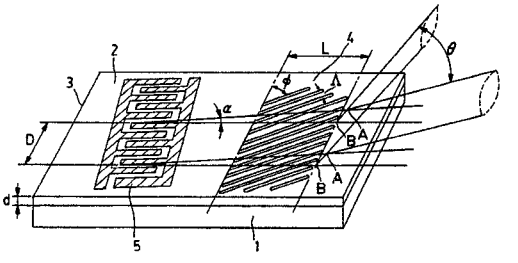
5,185,829 Feb. 9, 1993

Light Beam Deflector for Deflecting Light from Optical Waveguide by Inclined Grating

Inventors: Masaya Yamada and Ryo Enomoto.
Assignee: Ibiden Co., Ltd.
Filed: Aug. 15, 1990.

Abstract—A guided wave light-beam deflector enabling variation of laser light transmission direction with a large deviation, which has means for deflecting light in a plane parallel to an optical waveguide, and a grating as an output section disposed on the surface of or inside the waveguide and having an inclination with respect to a direction crossing at right angle to transmission direction of the guided wave, whereby light is deflected out of the plane parallel to the waveguide.

16 Claims, 1 Drawing Sheet



5,185,830 Feb. 9, 1993

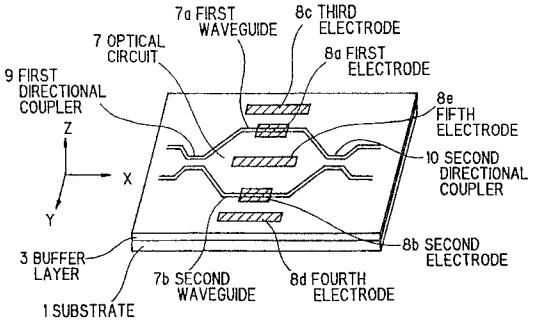
Optical Waveguide Directional Coupler Including Control Electrodes

Inventor: Hiroshi Nishimoto.
Assignee: NEC Corporation.
Filed: Sept. 3, 1991.

Abstract—An optical control device such as an optical switch includes two waveguides formed in an electro-optical substrate. Two control electrodes are preferably formed respectively above the two waveguides through a buffer

layer. The optical control device is further provided with additional electrodes formed where there is no waveguide therebelow. The additional electrodes are connected with either of the two control electrodes, so that there generates an electric field not only in the direction vertical to the surface of the substrate but in the direction parallel to the surface thereof.

13 Claims, 12 Drawing Sheets



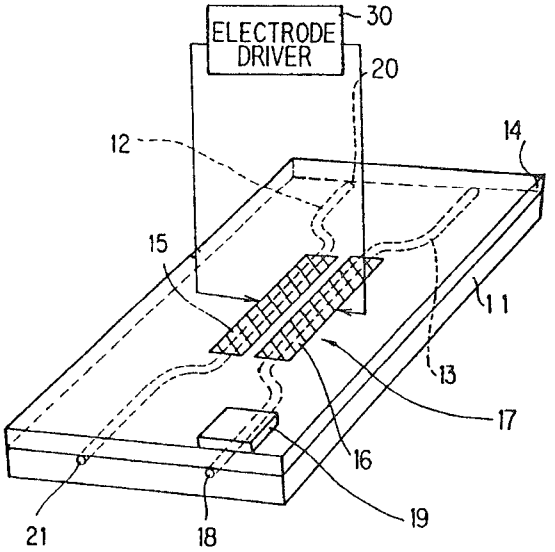
5,185,831 Feb. 9, 1993

Optical Waveguide Device

Inventor: Hisao Kawashima.
Assignee: NEC Corporation.
Filed: Apr. 30, 1992.

***Abstract*—A TE polarization absorption film is provided on an optical waveguide between an output end of the optical waveguide and a directional coupler composed of the optical waveguide and another optical waveguide. In accordance with the presence of the TE polarization absorption film, a difference of output light power between polarization components becomes minimized.**

4 Claims, 1 Drawing Sheet



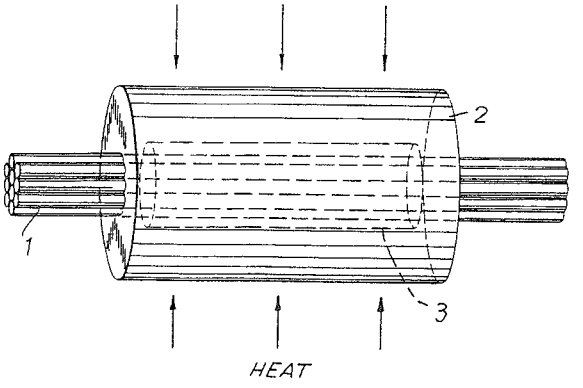
5,185,832 Feb. 9, 1992

Optical Coupler for Polymer Optical Waveguides

Inventors: Jochen Coutandin, Jürgen Theis, Werner Groh, and Andreas Brockmeyer.
Assignee: Hoechst Aktiengesellschaft.
Filed: Apr. 24, 1991

***Abstract*—Process for producing an optical coupler for polymer optical waveguides by arranging the optical waveguides in the same sense and bundling them by means of a plastic shrink-on sleeve. In this process, two to 10^5 polymer optical waveguides are arranged in the same sense and bundled and a plastic tube is put over the mixing region. Then a piece of plastic shrink-on sleeve is heated to a temperature at which it contracts. The shrinkage temperature of the shrink-on sleeve is inside the thermoelastic temperature range of the plastic tube. The optical waveguide bundle may be stretched during or after heating.**

18 Claims, 1 Drawing Sheet



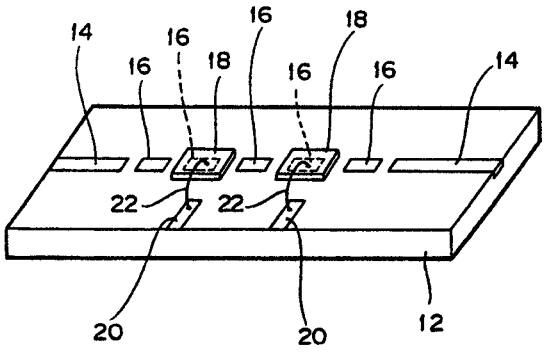
5,185,842 Feb. 9, 1992

Optical Waveguide Type Wavelength Filter

Inventor: Hironao Hakogi.
Assignee: Fujitsu Limited.
Filed: Oct. 4, 1991.

***Abstract*—An optical waveguide type wavelength filter having a Fabry–Perot resonator portion formed in the waveguide. The Fabry–Perot resonator portion has a length corresponding to the resonator length of the propagated light and formed by cutting at least two suitable gaps in the optical waveguide. By varying the index of refraction of the Fabry–Perot resonator portion by refractive index varying means, the resonator length L of the Fabry–Perot resonator portion is optically varied and, thereby, the filter characteristic of the Fabry–Perot resonator portion can be made variable.**

5 Claims, 2 Drawing Sheets



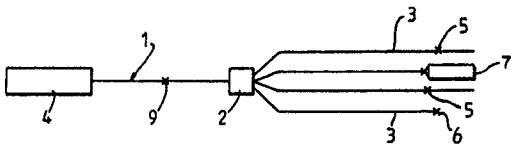
5,187,362 Feb. 16, 1993

Loss Detection in a Branched Optical Fiber

Inventor: Peter J. Keeble.
Assignee: British Telecommunications Public Limited Company.
Filed: Dec. 5, 1989.

Abstract—A method is described of detecting loss in a branched optical fibre network comprising a first optical fibre (1) and a plurality of second optical fibres (3) each of which is coupled to the first optical fibre. The first optical fibre (1) constitutes a main line. The method comprises the steps of launching a pulse into the main line (1) and monitoring the main line for changes in attenuation of reflected signals returning from the reflectors (5).

15 Claims, 1 Drawing Sheet



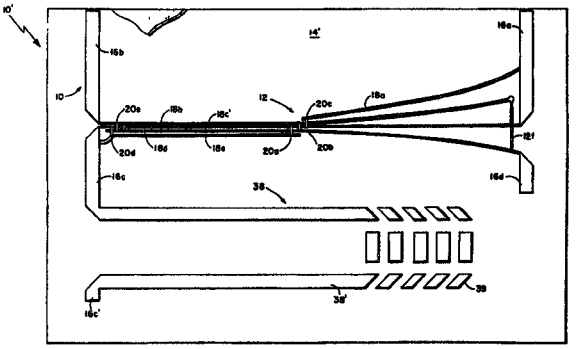
5,187,447 Feb. 16, 1993

Combiner/Divider Networks

Inventor: Ming-Chi Tsai
Assignee: Raytheon Company.
Filed: Nov. 25, 1991.

Abstract—A planar interdigitated microstrip coupler comprises a plurality of adjacently disposed transmission lines being spaced such that the transmission lines gradually diverge from a close spacing to a wider spacing. The planar interdigitated microstrip coupler provides equal power split and either 0° or 180° differential phase shift over a multi-octave bandwidth. Further, the interdigitated coupler, when used as a power combiner, provides increased cancellation of second order intermodulation products normally generated by non-linear devices, such as amplifiers, which may be fed to the inputs of the coupler. This increase is second harmonic cancellation, known for distorting signal fidelity, is particularly useful for monolithic circuit applications using amplifiers and mixers.

12 Claims, 5 Drawing Sheets



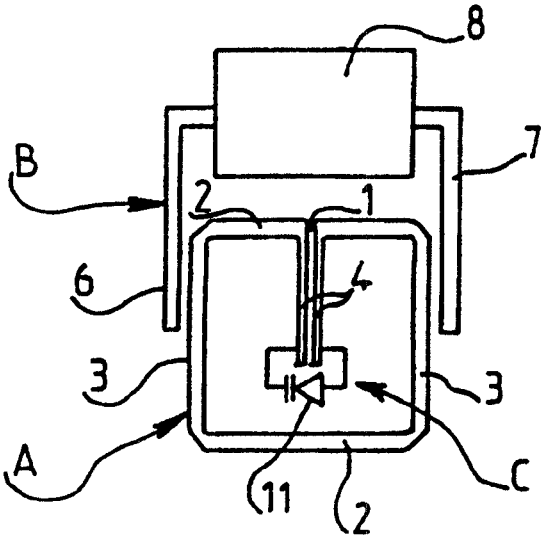
5,187,460 Feb. 16, 1993

Microstrip Line Resonator with a Feedback Circuit

Inventors: Gérard E. E. Forterre and Pierre Guillon.
Assignee: Tekelec Airtronic.
Filed: Mar. 7, 1991.

Abstract—A dielectric resonator has a pattern of metallic microwave strips deposited onto a dielectric substrate having a high relative permittivity. The pattern is of a generally annular shape and has a slot formed in the annular pattern. The resonator includes an positive feedback circuit coupled thereto having an active element, such as a transistor, and is usable, for instance, as a band-cut off or band-pass filter.

11 Claims, 2 Drawing Sheets



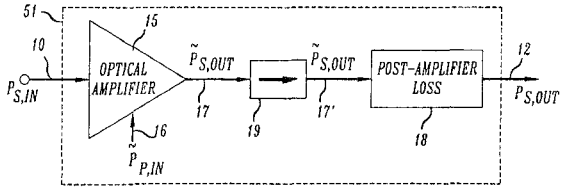
5,187,610 Feb. 16, 1993

Low Noise, Optical Amplifier Having Post-Amplification Loss Element

Inventors: Isam M. I. Habbab and Adel A. M. Saleh.
Assignee: AT&T Bell Laboratories.
Filed: Dec. 19, 1991.

Abstract—In an optical arrangement for amplifying an input lightwave signal by a predetermined amount to a desired output level, an optical amplifier is connected to a loss element. The optical amplifier is pumped by an amount exceeding a nominal amount wherein the nominal amount is the amount of pumping needed to attain the desired output level at the optical amplifier output. By attenuating the signal output from the optical amplifier, the loss element generates an output signal from the optical arrangement at the desired output level. This optical arrangement is characterized by an improved noise performance (noise figure) over standard optical amplifiers.

20 Claims, 8 Drawing Sheets



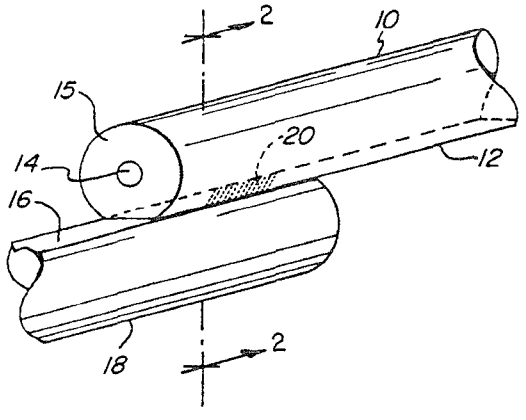
5,187,760 Feb. 16, 1993

Wavelength Selective Coupler for High Power Optical Communications

Inventor: David R. Huber.
Assignee: General Instrument Corporation.
Filed: Jan. 23, 1992.

Abstract—A wavelength selective optical fiber coupler having various applications in the field of optical communications is disclosed. The coupler includes a first substrate that has an optical input end for receiving a first optical signal. A first grating is formed in the first substrate. A second substrate has an optical input end for receiving a second optical signal. A second grating is formed in the second substrate. The first and second gratings are joined to transfer energy from the second optical signal to the first substrate for combination with the first optical signal. The combined signals are output from an optical output end of the first substrate. The gratings can comprise, for example, in-fiber gratings. Alternatively, at least one of the gratings can be provided in a polished optical block. The coupler can be used to combine a plurality of pump lasers operating at slightly different wavelengths, for input to an optical fiber amplifier having a broad pump band. A specific embodiment of a high power optical fiber amplifier using a neodymium fiber pump laser is also disclosed.

20 Claims, 3 Drawing Sheets



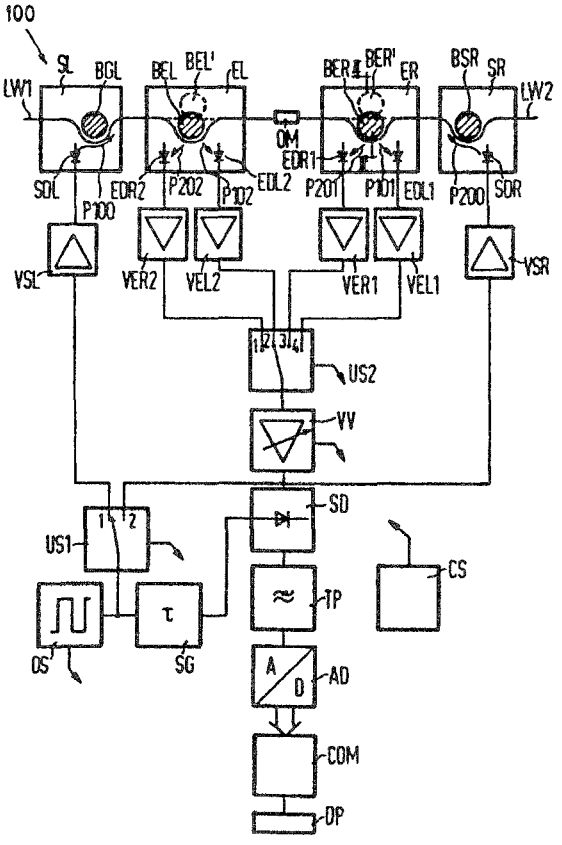
5,189,300 Feb. 23, 1993

Method and Apparatus for Measuring the Attenuation on an Optical Medium

Inventors: Winfried Lieber and Gervin Ruegenberg.
Assignee: Siemens Aktiengesellschaft.
Filed: Oct. 28, 1991.

Abstract—A method and apparatus for measuring the attenuation of optical medium utilizing a transmitter and a receiver arranged on each side of the medium. In the method, two-measurement series are acquired in succession and the reception signals thereof are derived both from the series using reception signals from both the right and left-hand transmitters on a first receiver, while the second receiver is uncoupled. Then, a second series is performed with the second receiver coupled in and the first receiver uncoupled.

14 Claims, 4 Drawing Sheets



5,189,483 Feb. 23, 1993

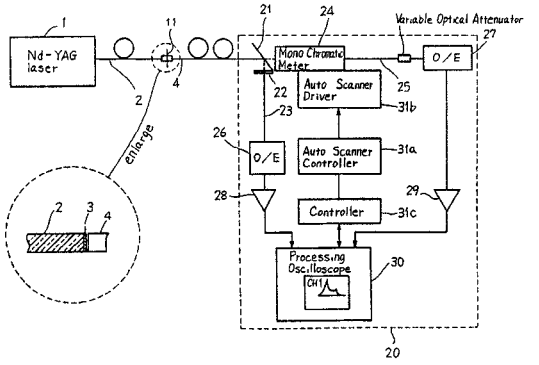
Apparatus for Measurement of Chromatic Dispersion in a Single Mode Optical Fiber

Inventor: Shinya Inagaki.
Assignee: Fujitsu Limited.
Filed: Sept. 25, 1991.

Abstract—An apparatus for measuring characteristics of chromatic dispersion includes a Raman oscillator generating a laser pulse with wide band wavelength. The laser pulse generated by a Raman oscillation is transmitted

through a selection and reflection film and then through a sample fiber. At an output end of the sample fiber, a reference wavelength light and an object wavelength light are received so that a delay time of the object wavelength light relative to the reference wavelength light is measured as a factor of a chromatic dispersion of the sample fiber.

3 Claims, 3 Drawing Sheets



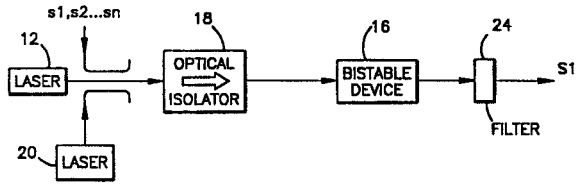
5,189,542 Feb. 23, 1993

System for the Optical Switching of Frequency Multiplexed Signals

Inventor: Jean-Louis Oudar.
Assignee: France Telecom Etablissement Autonome de Droit Public (Centre National d'Etudes des Telecommunications).
Filed: July 15, 1991.

Abstract—The system disclosed includes a light source (12) able to emit an intense, coherent, monochromatic beam, called the control beam, whose frequency is equal to the center optical frequency of one of several frequency multiplexed signals, which has been selected, an optical coupler (14) for coupling the signals and the control beam and an optical switching device (16) having an active material with a non-linear optical response, whose passband is narrower than the intervals separating frequency band occupied by the selected signal. The device receives the light from the optical coupler and supplies a beam reproducing the information of the selected signal. The invention can be used in telecommunications.

11 Claims, 2 Drawing Sheets



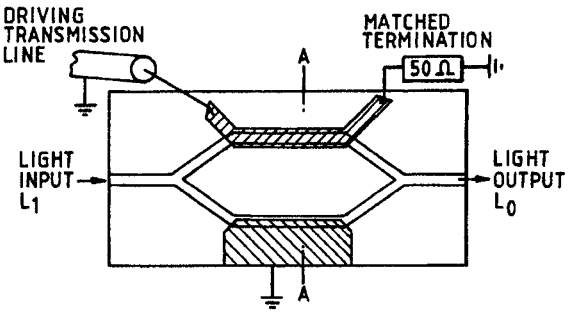
5,189,713 Feb. 23, 1993

Electro-Optic Device

Inventor: Robert N. Shaw.
Assignee: BT&D Technologies Limited.
Filed: Feb. 23, 1993.

Abstract—In electro-optic waveguide devices such as directional couplers and Mach–Zehnder interferometers having travelling-wave electrodes which overlie the waveguides, temperature sensitivity is reduced by arranging the ground plane electrode to overlie only part of the width of its associated waveguide portion. The invention has particular application to z-cut lithium niobate.

17 Claims, 3 Drawing Sheets



5,189,714 Feb. 23, 1993

Optical Wavelength Filter Device

Inventors: Hideaki Okayama and Takashi Ushikubo.
Assignee: Oki Electric Industry Co., Ltd.
Filed: Sept. 27, 1991.

Abstract—An optical wavelength filter device capable of increasing the number of channels by narrowing a line width and widening a tuning width and comprising a first optical wavelength filter of a mode conversion type and a second optical wavelength filter of an interferometer type optically coupled with the first optical wavelength filter.

9 Claims, 3 Drawing Sheets