Patent Abstracts

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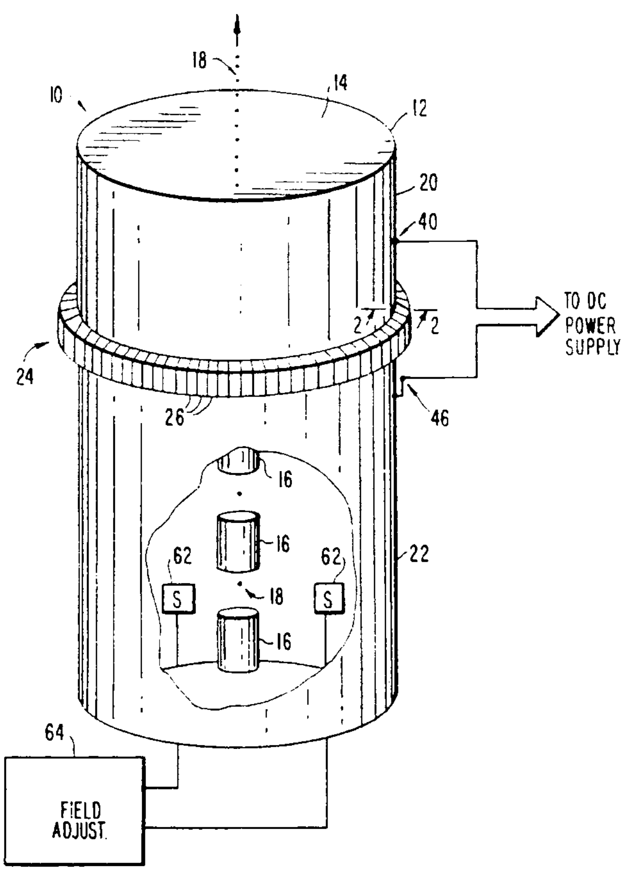
5,497,050 Mar. 5, 1996

Active RF Cavity Including a Plurality of Solid State Transistors

Inventor: Bernard R. Cheo.
Assignee: Polytechnic University.
Filed: Jan. 11, 1993.

Abstract—An active RF cavity is defined by a conductive wall in which a plurality of solid-state power amplifiers are mounted. The solid-state power amplifiers induce an RF current at an inner surface of the wall to form an oscillating electromagnetic (EM) field within the cavity. Preferably, the power amplifiers are in the form of modules that contain a number of RF power chips. The structure operates as both a power combiner and a matching transformer and is powered by a relatively low voltage dc source. A high-amplitude field is generated using equipment that is more efficient and much lighter in weight than conventional equipment. Such a cavity may be applied in a drift tube linac, an RF quadrupole linac, a linac having aligned cavities, and in other types of particle accelerators, and as a high-power RF amplifier with the EM waves piped out via a waveguide or a coaxial cable.

18 Claims, 5 Drawing Sheets



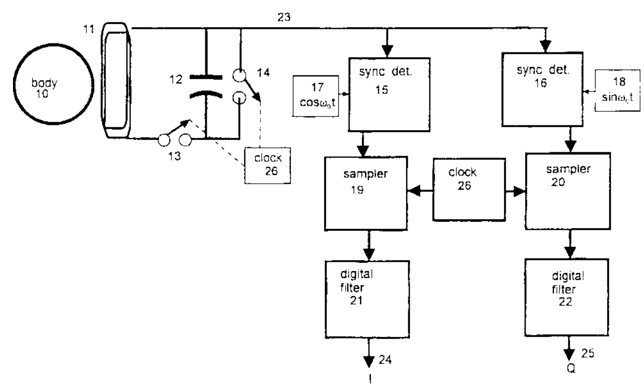
5,497,090 Mar. 5, 1996

Bandwidth Extension System Using Periodic Switching

Inventor: Albert Macovski.
Filed: Apr. 20, 1994.

Abstract—In applications where a tuned coil is used as a receiving antenna, the coil's resistance can produce excessive noise. If a low-loss coil is used, such as with cooled or superconductive wire, the resulting Q results in inadequate bandwidth. To provide the desired bandwidth without additional losses, the coil and its tuning capacitor are periodically de-energized using one or two switches. This sets the signal to substantially zero where it starts again to build up, effectively widening the bandwidth. The resulting signal is synchronously detected to provide the in-phase and quadrature signals. In an NMR system this enables the performance to be limited by sample or object noise. In MRI systems using an oscillating readout bias, the shorting is timed with the transition of the bias waveform.

19 Claims, 3 Drawing Sheets



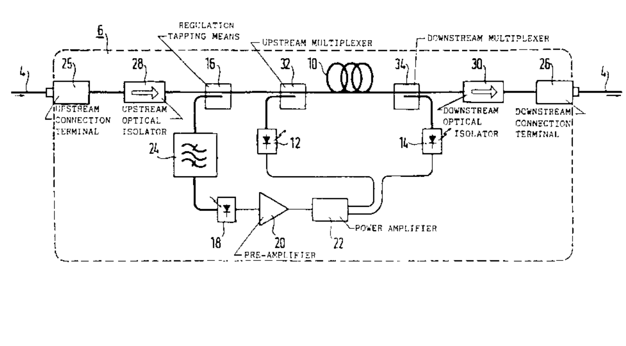
5,497,264 Mar. 5, 1996

Regulated Optical Amplifier

Inventors: Dominique Bayart, Bertrand Clesca, and José Chesnoy.
Assignee: Alcatel N.V.
Filed: Jan. 11, 1995.

Abstract—An amplifying optical fiber amplifies a plurality of wavelength-multiplexed carrier waves. The invention enables the gain as seen by each of the carrier waves to be maintained, in particular when the total input power varies. For that purpose, amplified spontaneous "reverse" emission light is servo-controlled in power. After being filtered in a filter and detected by a photodiode, said light controls the powering current supplied to two laser diodes for pumping the fiber. The invention applies in particular to implementing optical transmission networks.

4 Claims, 1 Drawing Sheet



Publisher Item Identifier S 1051-8207(97)01779-0.

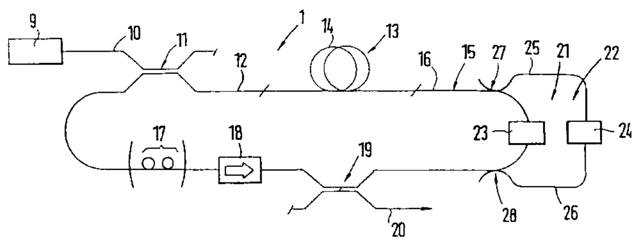
5,497,385 Mar. 5, 1996

Optical Microwave Generator

Inventor: Harald Schmuck.
Assignee: Alcatel SEL Aktiengesellschaft.
Filed: Jan. 13, 1994.

***Abstract*—**The invention relates to a microwave generator, which is characterized by a multimode fiber ring laser (**1**) having associated with it an intermediate-frequency device (**22**) that generates the microwave frequency by forming the difference of the frequencies assigned to the modes.

25 Claims, 4 Drawing Sheets



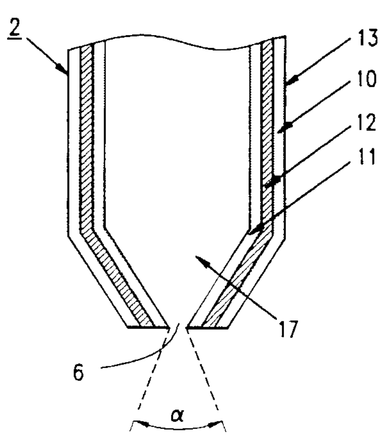
5,497,441 Mar. 5, 1996

Hollow Waveguide Tips for Controlling Beam Divergence and Method of Making Such Tips

Inventors: Nathan Croitoru, Jacob Dror, Israel Gannot, and Reuben Dahan.
Assignee: Ramot University Authority for Applied Research & Industrial Development Ltd.
Filed: July 6, 1994.

***Abstract*—**A hollow waveguide for guiding laser energy includes a proximal end for receiving the laser energy and a distal end terminating in a distal tip for delivering the laser energy to a working area. The distal end of the hollow waveguide includes an annular, converging, inner surface converging the laser energy toward the distal tip so as to concentrate the laser energy delivered through the distal tip to the working area. Also described are methods of making the hollow waveguide.

20 Claims, 2 Drawing Sheets



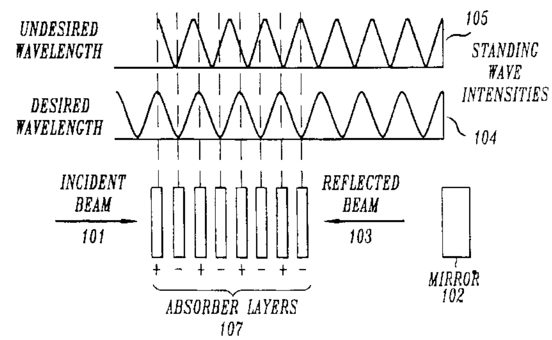
5,498,863 Mar. 12, 1996

Wavelength-Sensitive Detectors Based on Absorbers in Standing Waves

Inventor: David A. B. Miller.
Assignee: AT&T Corp.
Filed: Apr. 30, 1993.

***Abstract*—**An optoelectronic detector includes multilayered semiconductor structures that are placed at particular positions in a standing wave pattern in order to measure the intensity of the light beams passing through said structures' layers. The detector is made sensitive to particular wavelengths by either changing the light beams intensity or varying the absorbance of the layers.

6 Claims, 6 Drawing Sheets



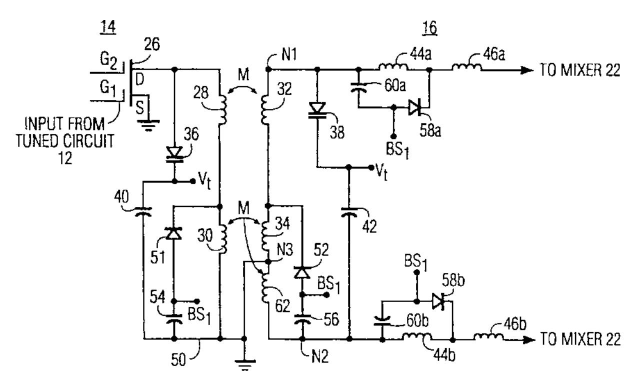
5,499,056 Mar. 12, 1996

Bandswitchable Double-Tuned RF Circuit with Balanced Secondary

Inventor: Michael A. Pugel.
Assignee: Thomson Consumer Electronics, Inc.
Filed: Aug. 8, 1994.

***Abstract*—**A band switchable double-tuned circuit having a balanced secondary is presented. A primary tunable tank circuit with a plurality of first inductances is tuned to a first frequency by a first capacitor coupled in parallel with the first inductances. A secondary tank circuit with a plurality of second inductances inductively coupled to ones of the first inductances has a second capacitor coupled in parallel with the second inductances for tuning the secondary to the first frequency. The dc reference potential for the secondary circuit is coupled to a nodal junction of the plurality of second inductances with the secondary tank circuit providing a balanced signal output. At least one of the plurality of first inductances and the second inductances are switchable for bandswitching the tuning of the primary and secondary tank circuits to a second frequency. The output signal from the balanced secondary is coupled to the input of a balanced mixer via constant bandwidth inductances without a mixer input balance transformer.

6 Claims, 2 Drawing Sheets



5,499,307 Mar. 12, 1996

Optical Isolator and Polarization Splitter Therefor

Inventor: Shinji Iwatsuka.
Assignee: TDK Corporation.
Filed: Oct. 11, 1994.

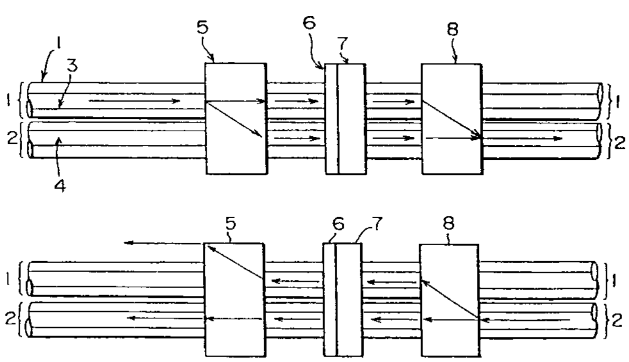
Abstract—An optical isolator having no dependence on direction of plane of polarization is provided by using a pair of polarization splitters, each comprising at least two parallel optical waveguides, and a birefringent crystal plate inserted in a groove formed obliquely in said waveguides. A plane formed by said two optical waveguides is parallel to vector normal to the incident surface of said birefringent crystal plate, the optical axis of said birefringent crystal plate is also parallel to said plane, and the following relationship is substantially satisfied:

$$\tan\theta_{in} = A/[\sqrt{B}(n_{in} - \sqrt{B})]$$

where

1) $A = (n_O^2 - n_E^2)\cos\theta_C \sin\theta_C$;
2) $B = n_E^2 \sin^2\theta_C + n_O^2 \cos\theta_C$;
3) n_{in}: refractive index of the optical waveguides;
4) n_O: refractive index of the birefringent crystal plate for ordinary light;
5) n_E: refractive index of the birefringent plate for extraordinary light;
6) θ_{in}: angle between axes of the optical waveguides and the vector normal to the incident surface of each of the birefringent crystal plates;
7) θ_C: angle between axes of the optical waveguides and the optical axis of the birefringent crystal plate (side opposite to θ_{in} is deemed positive).

12 Claims, 5 Drawing Sheets



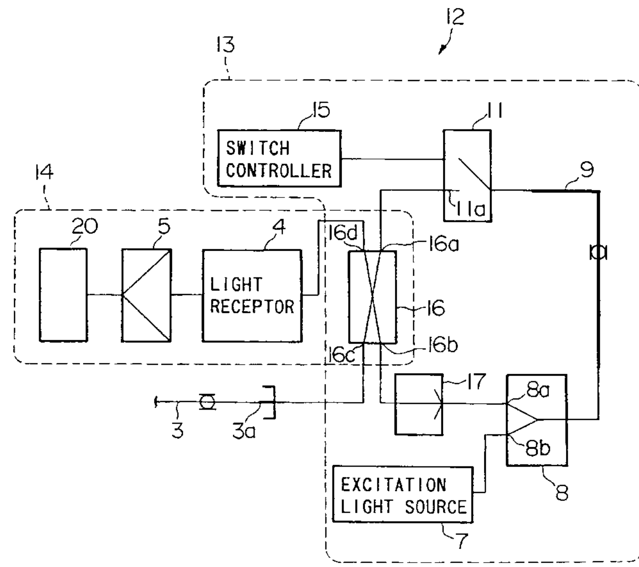
5,500,731 Mar. 19, 1996

Optical Time Domain Reflectometer Using Ring Laser Light Source

Inventors: Mitsuhisa Sato, Mikio Maeda, and Shinichi Furukawa.
Assignee: Ando Electric Co., Ltd. and Nippon Telegraph and Telephone Corporation.
Filed: Oct. 28, 1994.

Abstract—The purpose of the present invention is to provide a time domain reflectometer in which the system cost is low and the dynamic range is wide. In accordance with the present invention, an excitation light source for generating continuous light of a predetermined frequency (e.g., 1.48 μm), and a ring laser part for generating a high-power light pulse in accordance with the continuous light are provided. A light branch device is held in common by the ring laser part and a measurement part. The light branch device makes the light pulse, which has been incident on one of its end parts, to be incident on a light cable to be measured; the light branch device also receives response light and supplies the response light to a light receptor in the measurement part. In the measurement part, the response light is converted to a corresponding electric signal and the signal is amplified to be supplied to a measurement circuit.

3 Claims, 3 Drawing Sheets



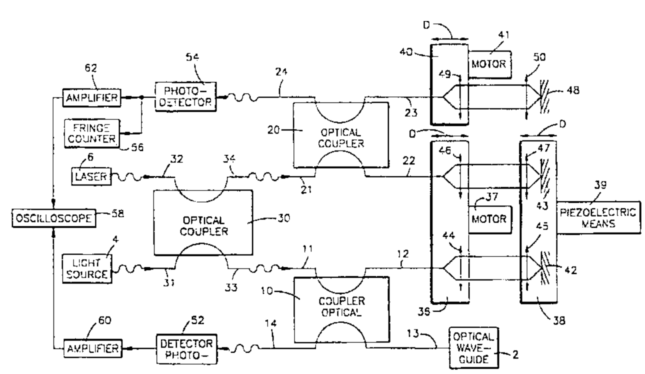
5,500,733 Mar. 19, 1996

Interferometric System for the Detection and Location of Reflecting Faults of Light-Guiding Structures

Inventors: Christian Boisrobert, Jean-Francois Lucas, and Michel Dontenwille.
Assignee: France Telecom.
Filed: July 26, 1993.

Abstract—An interferometric system for sensing and locating reflective defects in light-conducting structures comprises a monomode laser source (**6**), an incoherent source (**4**) with substantially the same central wavelength as the laser source, first and second couplers (**10**, **20**) connected to the sources and to light sensors (**52**, **54**), a first support (**36**) movable in one direction (D) and connected to the ends of the first and second couplers, a second support (**38**) oscillating in the same direction (D), and reflectors (**42**, **43**) attached to the second support opposite the ends of the first and second couplers. A third support (**40**) is movable in the same direction (D) and connected to one end of the second coupler (**20**), a further stationary reflector (**48**) opposite said end, of the second coupler. The first coupler is connected to an optical waveguide (**2**), and devices (**56**, **58**) for locating reflective defects in the waveguide.

6 Claims, 4 Drawing Sheets



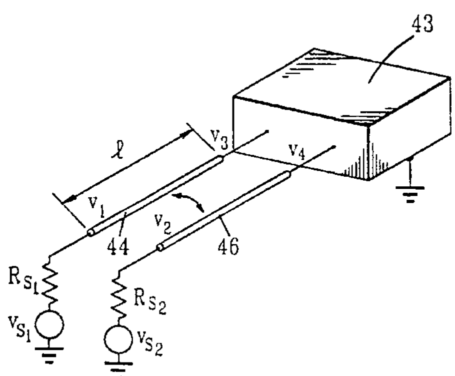
5,502,392 Mar. 26, 1996

Methods for the Measurement of the Frequency Dependent Complex Propagation Matrix, Impedance Matrix, and Admittance Matrix of Coupled Transmission Lines

Inventors: Gnanalingam Arjavalingam, Alina Deutsch, Gerard V. Kopcsay, and James K. Tam.
Assignee: International Business Machines Corporation.
Filed: Nov. 12, 1993.

Abstract**—**A method for completely characterizing coupled transmission lines by short-pulse propagation is described. The complex frequency-dependent propagation matrix, impedance matrix, and admittance matrix for a set of n parallel transmission lines can be determined by comparing the properties of two sets of coupled transmission lines of different length. Each transmission line set has two conductors of unequal length and ground conductors to form a coupled transmission line system. Each transmission line set can have uncoupled ends. An input pulse is provided at least one node of each transmission line set. The complex frequency-dependent propagation matrix of each transmission line set is determined by a comparison of the output pulses at the remaining nodes of each transmission line set, which involves ratioing to cancel out the effect of the pad-to-probe discontinuity and the uncoupled ends, which make it unnecessary to do any embedding. For a transmission line wherein the dielectric loss is negligible, the complex frequency dependent characteristic admittance can be determined from the propagation matrix and the empirically determined capacitance matrix. For a transmission line wherein the resistive loss is negligible, the frequency-dependent characteristic impedance matrix can be determined from the propagation matrix and the empirically determined inductance matrix. Specific structures are used with the measurement method to determine these coupled transmission line parameters. The method is particularly useful to determine these parameters for transmission lines in semiconductor chip packaging substrates.

29 Claims, 4 Drawing Sheets



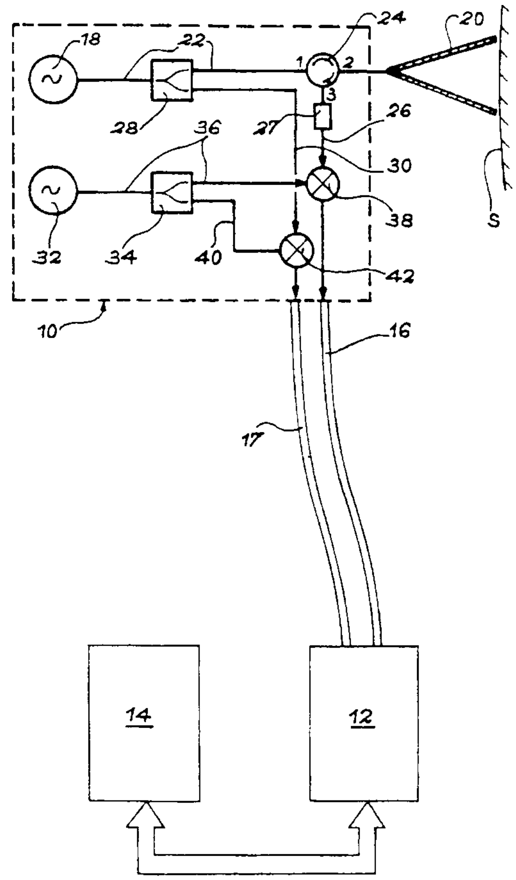
5,502,394 Mar. 26, 1996

Compact, Portable Device for Measuring the Reflection Coefficient of a Structure Exposed to Microwave Radiation

Inventor: Gérard P. Piau.
Assignee: Aerospatiale Société Nationale Industrielle.
Filed: Oct. 20, 1994.

Abstract**—**In order to measure the amplitude and the phase of the reflection coefficient of a structure (S) such as a radar protection radome, particularly following a repair, a measuring device is proposed, whereof a portable part (**10**) makes it possible to transform the microwave measuring and reference signals into low-frequency signals. These low-frequency signals are then transferred by flexible cables (**16**, **17**) to a calculating part (**12**, **14**) without it being possible to create phase distortions by twisting of the cable. The signals are transformed by giving the portable part, in addition to the main microwave generator (**18**), a second microwave generator (**32**), whose frequency (f_2) differs from that (f_1) of the main generator by a given low frequency (f_0). Microwave mixers (**38**, **42**) use the radiation emitted by the second generator (**32**) in order to give the measuring signal and the reference signal, initially at the frequency (f_1), the low frequency (f_0).

7 Claims, 1 Drawing Sheet



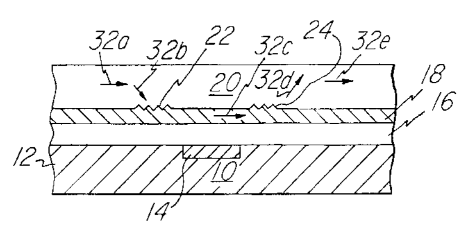
5 502 779 Mar. 26, 1996

Integrated Optical Modulator and Waveguide and Method

Inventor: Gregory A. Magel.
Assignee: Texas Instruments Incorporated.
Filed: Nov. 7, 1994.

Abstract**—**An optical waveguide (**20**) is comprised of a core layer (**20**) fabricated on an interference layer (**18**). The interference layer (**18**) is supported by a lower cladding layer (**16**) deposited on a semiconductor substrate (**12**), and a light travels through the core layer and is coupled into the interference layer by a grating. An electronic element in the interference layer modulates the light passing through the interference layer. The modulated light is then coupled back into the core layer by either another portion of the grating, or a separate grating.

19 Claims, 4 Drawing Sheets



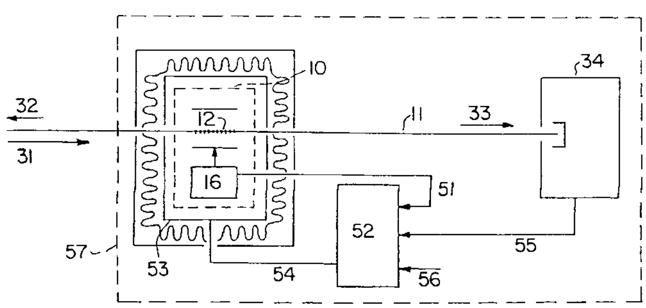
5,502,782 Mar. 26, 1996

Focused Acoustic Wave Fiber Optic Reflection Modulator

Inventor: Ronald H. Smith.
Assignee: Optelecom, Inc.
Filed: Jan. 9, 1995

Abstract—An improved optical fiber modulator producing a focused acoustic wave propagating from an acoustic transducer surrounding an optical fiber having an in-fiber reflection grating changes the core refractive index in proportion to the induced strain at the core when the focused acoustic wave arrives at the optical fiber core, and focused acoustic waves can also modulate optical carrier phase in a length of optical fiber which may lie in an arm of an interferometer. In a preferred embodiment, the index change shifts the reflection spectrum of an in-fiber grating located in the portion of optical fiber core on which the focused acoustic wave is centered with the reflection spectrum shift producing a change in the grating reflectivity for a narrow bandwidth optical signal on a skirt of the grating spectrum. Electronic multiplexing means may be used to both transmit and receive signal information on a single optical carrier signal, and a plurality of acoustic wave modulators may be placed along a single optical fiber, simultaneously modulating a plurality of optical signals, each having an optical frequency matched to one of the modulator gratings. Acoustic wave modulators may be tuned to a range of optical carrier frequencies using thermal or mechanical strain control, and a series of tuned modulators lined up along an optical fiber accessed through an optical circulator will reflect and modulate selected signals, which are then forwarded back through the circulator onto a transmission line optical fiber.

36 Claims, 8 Drawing Sheets



5 502 783 Mar. 26, 1996

Polarization-Independent Optical Directional Coupler Wavelength Tunable Filters/Receivers

Inventor: Chi Wu.
Assignee: Northern Telecom Limited.
Filed: Aug. 18, 1994.

Abstract—A polarization-independent tunable filter/receiver for optical communications. The tunable filter, operating as a directional coupler, has three waveguides including a central, feedguide, and a pair of branch waveguides. Through either electrooptic effects or free carrier injection, the TM and TE polarization modes of the central wavelength can be coupled from the feedguide to the appropriate branch guide. The separated modes can be either detected independently or reunited in phase for further processing.

34 Claims, 21 Drawing Sheets