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 USA.

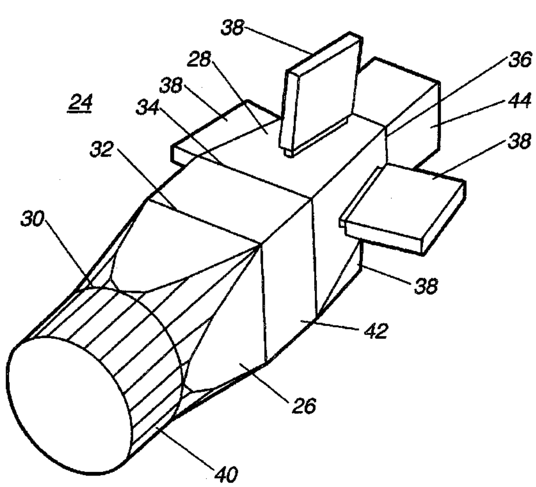
6,313,714 November 6, 2001

WAVEGUIDE COUPLER

Inventors: Gregory P. Junker (El Segundo, CA, US) and Vrage Minassian (Burbank, CA, US).
Assignee: TRW Inc. (Redondo Beach, CA, US)
Filed: October 15, 1999.

Abstract—A first embodiment of a waveguide coupler **(10)** has a substantially square cross-section with a width tapering from a first width a at a first end **(12)** to a smaller width b at a second end **(14)**. Each side of the square waveguide coupler is provided with a turnstile port **(16)**. The first end is coupled to a first waveguide **(18)** to couple the turnstile ports with the first waveguide, while the second end is coupled to a second waveguide, coupling the first and second waveguides together. Signals throughout the waveguide coupler's lower frequency band can be coupled between the turnstile ports and the first waveguide, while signals throughout the higher end of the frequency band can be coupled from the first waveguide to the second waveguide and signals within the frequency band can be coupled from the second waveguide to the first waveguide. A second embodiment **(24)** includes a first waveguide coupling section **(26)** having a first end **(30)** with a substantially circular cross-section which is connected to a circular first waveguide **(40)** and a second end **(32)** with a substantially square cross-section. A second waveguide coupling section **(28)** has a configuration like waveguide coupler **(10)** of the first embodiment. The larger end of the second waveguide coupling section is coupled to the first waveguide coupling section to couple the turnstile ports with the first waveguide. The second of the second waveguide coupling section is coupled to a square second waveguide to couple the first and second waveguides together.

6 Claims, 1 Drawing Sheet



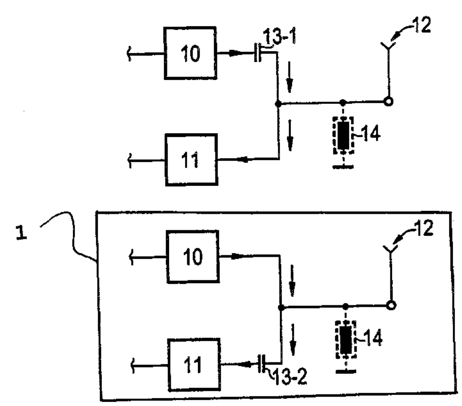
6,313,715 November 6, 2001

SAW DUPLEXER

Inventors: Andreas Bergmann (Haiming, DE) and Peter Müller (München, DE).
Assignee: Siemens Matsushita Comp. GmbH & Co. KG (Munich, DE)
Filed: November 8, 1999.

Abstract—A SAW duplexer having an impedance transformation network in a form of a series capacitance in at least one filter path.

12 Claims, 1 Drawing Sheet



6,313,716 November 6, 2001

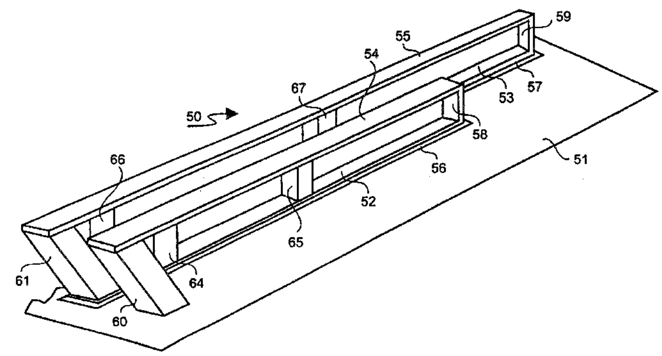
SLOW WAVE MEANDER LINE HAVING SECTIONS OF ALTERNATING IMPEDANCE RELATIVE TO A CONDUCTIVE PLATE

Inventor: John T. Apostolos (Merrimack, NH, US)
Assignee: Lockheed Martin Corporation (Nashua, NH, US)
Filed: February 17, 1995.

Abstract—A meander line includes a electrically conductive plate, a plurality of transmission line sections supported with respect to the conductive plate, wherein the plurality of sections includes a first section located relatively closer and parallel to the conductive plate to have a relatively lower characteristic impedance with the conductive plate and a second section located parallel to and at a relatively greater distance from the conductive plate than the first section to have a relatively higher characteristic impedance with the conductive plate and connector means for interconnecting the first and second sections and maintaining an impedance mismatch therebetween.

Publisher Item Identifier S 1531-1309(02)05338-2.

7 Claims, 2 Drawing Sheets



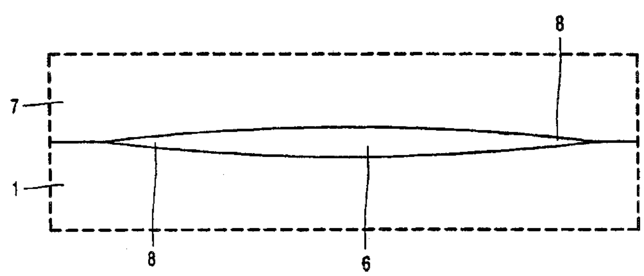
6,313,718 November 6, 2001

HIGH FREQUENCY DIELECTRIC DEVICE

Inventor: Kenichi Horie (Machida, JP)
Assignee: U.S. Philips Corporation (New York, NY, US)
Filed: November 12, 1999.

***Abstract*—**A dielectric device for high frequency application with a reduced loss of a high frequency component has at least a first dielectric on which a conductor is disposed and a second dielectric laminated on this dielectric and an additional dielectric with a dielectric constant lower than those of the first and second disposed in the vicinity of the side edge of the conductor.

4 Claims, 2 Drawing Sheets



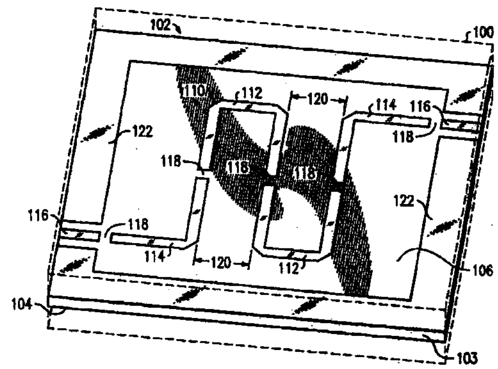
6,313,719 November 6, 2001

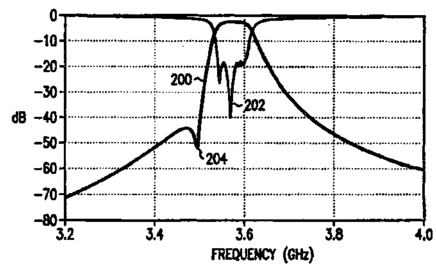
METHOD OF TUNING A PLANAR FILTER WITH ADDITIONAL COUPLING CREATED BY BENT RESONATOR ELEMENTS

Inventors: Ron Barnett (Santa Rosa, CA, US), Yee Leng Low (Berkeley Heights, NJ, US), Zhengxiang Ma (Summit, NJ, US), Klng L Tal (Berkeley Heights, NJ, US), and Hui Wu (Union, NJ, US).
Assignee: Avaya Technology Corp. (Basking Ridge, NJ, US)
Filed: March 9, 2000.

***Abstract*—**A bandpass planar filter **(110)** comprises a signal input and a signal output **(116)** and one or more resonator elements **(112, 114)** coupled serially end-to-end between the input and the output across gaps **(118)** that separate the elements from the input, the output and from each other. The resonator elements form a serpentine shape such that at least two portions of the serpentine shape are positioned side-by-side parallel to each other separated by a spacing **(120)**. The side-by-side portions effect additional coupling between the resonator elements that forms a notch (transmission zero) **(204)** in the passband **(200)** of the filter. The input, output and resonator elements are etched into one surface **(106)** of a PC board **(102)**; the other surface **(104)** of the PC board forms a ground plane of the filter and the substrate **(103)** of the PC board forms a dielectric of the filter.

2 Claims, 4 Drawing Sheets





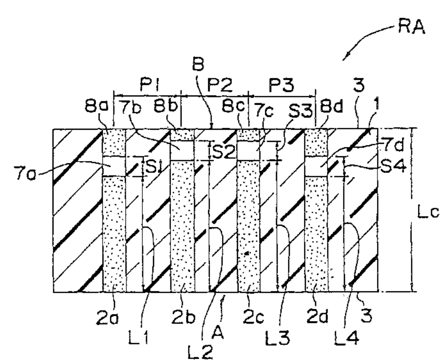
6,313,720 November 6, 2001

DIELECTRIC RESONATOR DEVICE HAVING RESONATOR ELECTRODES WITH GAPS

Inventors: Yukihiro Kitaichi (Icikawa-ken, JP) and Yasuo Yamada (Kanazawa, JP).
Assignee: Murata Manufacturing Co., Ltd. (JP)
Filed: September 27, 1999.

***Abstract*—**A dielectric resonator device in which resonant electrodes are provided in or on a dielectric block and another ground electrode is formed on an outer face of the dielectric block. Lengths of the resonant electrodes are determined according to desired resonance frequencies of the respective resonators, while widths of gap regions in the through-holes having no electrodes are determined according to the desired amounts of coupling between the respective resonators. Since the dielectric block may be standardized, various kinds of dielectric resonator devices having different characteristics can be obtained without increasing the required numbers of kinds of molding metal molds.

14 Claims, 4 Drawing Sheets



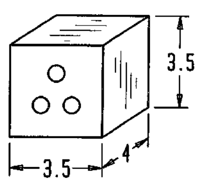
6,313,721 November 6, 2001

HIGH PERFORMANCE DIELECTRIC CERAMIC FILTER USING A NON-LINEAR ARRAY OF HOLES

Inventors: Masahiko Kitajima (Ube, JP), Kosuke Nishimura (Ube, JP), and Nobuhiro Harada (Yamaguchi, JP).
Assignee: Ube Electronics, Ltd. (Mine, JP)
Filed: March 17, 2000.

***Abstract*—**A high performance dielectric ceramic filter in a small package is designed with one or more holes positioned off of the straight-line bisecting at least two holes. This configuration allows for the elimination of at least one trap hole while maintaining a given performance characteristic for the filter. In one specific embodiment of the present invention the performance characteristics of a conventional five-hole ceramic filter is realized in a three-hole filter wherein the holes are positioned so as to form the vertices of a triangle. The width of the resulting filter is approximately 50% of the width of the conventional five-hole filter it can replace. In another embodiment the same triangular positioning may be used to realize the performance characteristics of a four-hole ceramic filter.

8 Claims, 5 Drawing Sheets



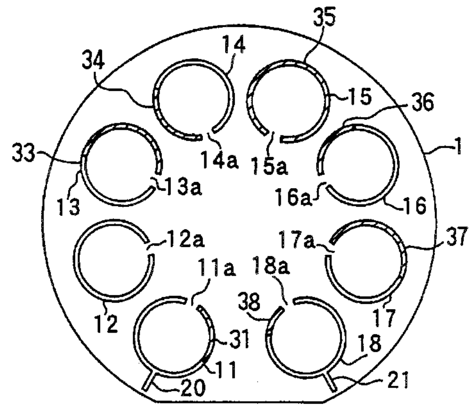
6,313,722 November 6, 2001

FILTER HAVING RESONANT FREQUENCY ADJUSTED WITH DIELECTRIC LAYER

Inventors: Genichi Tsuzuki (Nishikamo-gun, JP) and Masanobu Suzuki (Toki, JP).
Assignee: Advanced Mobile Telecommunication Technology Inc. (Nisshin, JP)
Filed: July 8, 1999.

***Abstract*—**Plural resonators formed on a dielectric substrate constitute a filter. The resonant frequency of each resonator is adjusted to a target frequency by accumulating dielectric material on the resonator. The degree of such adjustment is substantially proportional to the amount of the dielectric material. The resonators are originally designed to have resonant frequency that is a little higher than the target frequency. The resonant frequency of each resonator deviates from the designed target because of various factors in manufacturing processes. Each resonant frequency is measured, its deviation from the target is calculated and the amount of the dielectric material required to eliminate such deviation is determined before the adjustment process. Accordingly, the adjustment is easily performed without measuring the resonant frequency during the adjustment process.

16 Claims, 5 Drawing Sheets



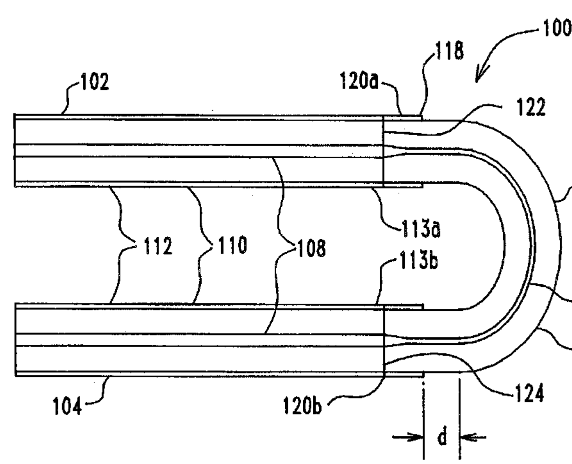
6,314,219 November 6, 2001

FIBER MINI-BEND LIGHT GUIDE

Inventors: Yi Zhang (Cupertino, CA, US) and Gary Ball (Los Gatos, CA, US).
Assignee: JDS Uniphase Corporation (San Jose, CA, US)
Filed: September 23, 1999.

***Abstract*—**A mini-bend optical arrangement and an associated method are described. This arrangement is designed to change the directional orientation of a light path using optical fiber. A first and a second fiber optic member define first and second light paths, respectively, which first and second members include a numerical aperture and which introduce substantial bend losses upon being bent at less than a predetermined bend radius. The first and second fiber optic members are arranged along the first and second paths preferably bent by less than the predetermined bend radius. A bent fiber optic member including a numerical aperture that is greater than the numerical aperture of the first and second fiber optic members interconnects the first and second fiber optic members so as to define a continuous light path including the first and second light paths with the bent member defining a curved path therebetween such that the bent fiber optic member has a bend radius which is less than the predetermined bent radius but which avoids introducing substantial bend losses. The mini-bend arrangement is useful in highly advantageous miniaturized device configurations. As a first example, a miniaturized add/drop module is introduced. As other example, miniaturized tree couplers, EDFA modules and WDM modules are introduced.

20 Claims, 6 Drawing Sheets



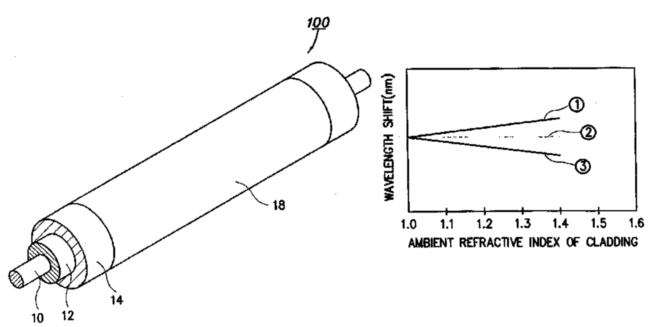
6,314,222 November 6, 2001

LONG-PERIOD OPTICAL FIBER GRATING FILTER DEVICE

Inventors: Joo-Nyung Jang (Seoul, KR), Sun-Wook Kim (Seoul, KR), Se-Yoon Kim (Auyang-shi, KR), and Min-Sung Kim (Songnam-shi, KR).
Assignee: Samsung Electronics Co., Ltd. (Kyungki-Do, KR)
Filed: December 21, 1999.

***Abstract*—**A long-period fiber grating filter device which includes a core having refractive index modulations formed therein at every predetermined distance, a cladding surrounding the core, a coating covering the cladding portion not adjacent to the long-period fiber gratings, a recoating covering the cladding portion adjacent to the long-period fiber gratings, a long-period fiber grating where a coupling wavelength exhibits a negative wavelength shift with respect to temperature change according to the amount of a dopant added to the core and a recoating material where the refractive index decreases with temperature increase and the coupling wavelength exhibits a positive wavelength shift by the effect of the recoating material, wherein the negative wavelength shift in long-period fiber grating itself and the positive wavelength shift by the effect of the recoating material balance each other to eliminate temperature control in the long-period grating filter device.

5 Claims, 14 Drawing Sheets



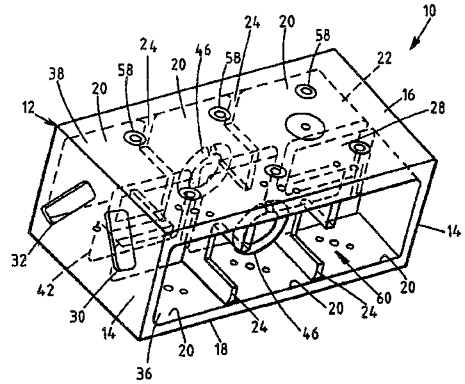
6,314,309 November 6, 2001

DUAL OPERATION MODE ALL TEMPERATURE FILTER USING SUPERCONDUCTING RESONATORS

Inventor: Amr Abdelmonem (Arlington Heights, IL, US)
Assignee: Illinois Superconductor Corp. (Mt. Prospect, IL, US)
Filed: September 22, 1998.

***Abstract*—**A dual operation mode all temperature filter is provided. The dual operation mode filter is provided with a housing defining at least two cavities, an input port and an output port. It is also provided with a nonsuperconducting resonator disposed in a first one of the cavities and a superconducting resonator disposed in a second one of the cavities. The second resonator comprises a superconducting material containing 8–15% silver. The dual operation mode filter filters at a relatively high level at temperatures below a threshold temperature and at a lower, conventional level, at temperatures below the threshold.

7 Claims, 4 Drawing Sheets



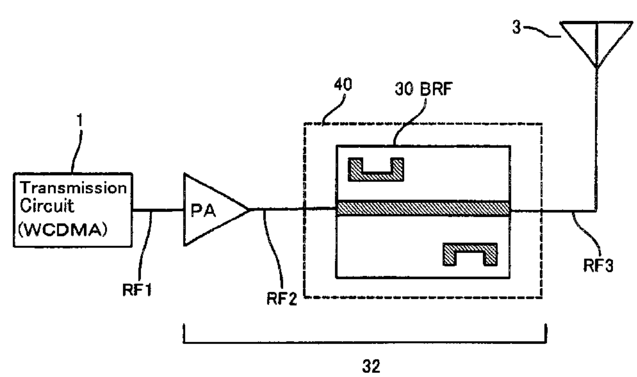
6,317,003 November 13, 2001

RADIO-FREQUENCY AMPLIFIER AND RADIO COMMUNICATION SYSTEM USING IT

Inventor: Kazuhiko Kobayashi (Kawasaki, JP)
Assignee: Fujitsu Limited (Kawasaki, JP)
Filed: March 14, 2000.

***Abstract*—**A radio-frequency amplifier including a power amplifier for amplifying the power of a radio-frequency signal in a desired frequency band; and a band rejection filter for receiving the radio-frequency signal from the power amplifier and for restricting the spread of the signal spectrum into frequency bands which lie adjacent to the desired band of the radio-frequency signal. The band rejection filter includes a first line, which is formed of a nonsuperconducting material and which receives a radio-frequency signal and a second line, used for resonance, which is formed of a superconducting material and which resonates with adjacent frequencies. Because the thus arranged superconducting filter is employed, a radio-frequency signal is transmitted at a high power along the first line, while a radio-frequency signal in an adjacent frequency band, for which the power is comparatively low and is to be removed, is suppressed along the second line, which is formed of a superconducting material. Therefore, the superconducting band rejection filter can retain a sharp skirt characteristic for a signal having a high frequency and high power and can also maintain its superconductivity.

10 Claims, 10 Drawing Sheets



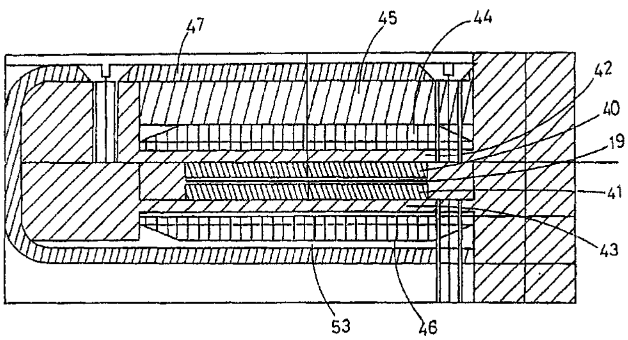
6,317,010 November 13, 2001

THERMOSTABLE CIRCULATOR WITH THE MAGNETIC CHARACTERISTICS OF THE FERRITE AND MAGNET CORRELATED

Inventors: Roger John Butland (Wellington, NZ), Alexander Grigorievich Schuchinsky (Wellington, NZ), and Gerald Leigh Therkleson (Wellington, NZ).
Assignee: Deltec Telesystems International Limited (Wellington, NZ)
Filed: May 23, 2000.

Abstract—A circulator having integrally formed conductors **(20, 21** and **22)** which may be folded to form overlaying conductors of a circulator. The circulator includes a lens **(44)** for shaping a biasing magnetic field distribution to compensate for nonuniformity of magnetic field strength caused by irregularities of a magnetic circuit or the shape of a magnet **(45)** or ferrite **(40, 41)**. The characteristics of ferrite discs **(40, 41)** are preferably correlated with the characteristics of a permanent magnet **(45)** so that variations of permeability of the ferrite **(40, 41)** are minimized over a specified temperature range.

15 Claims, 12 Drawing Sheets



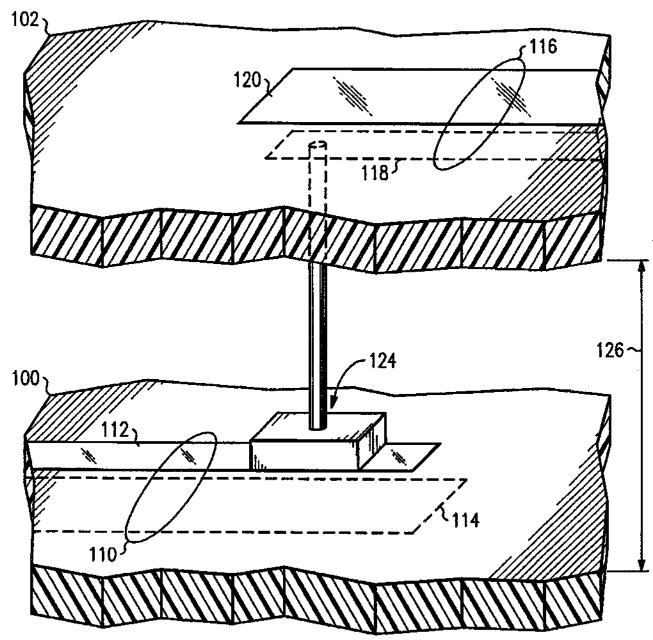
6,317,011 November 13, 2001

RESONANT CAPACITIVE COUPLER

Inventors: Ron Barnett (Santa Rosa, CA, US), Charles Joseph Buondelmonte (Yardley, PA, US), Ilya Alexander Korisch (Somerset, NJ, US), Louis Thomas Manzione (Summit, NJ, US), Richard F Schwartz (Cranbury, NJ, US), and Hui Wu (Union, NJ, US).
Assignee: Avaya Technology Corp. (Basking Ridge, NJ, US)
Filed: March 9, 2000.

Abstract—A resonant capacitive coupler **(124)** couples signals across a gap **(126)** between signal transmission lines **(112, 118)** of two printed wiring boards **(100, 102)**. The coupler has a conductive contact member **(202** or **302)** that is either positioned in close proximity to one of the transmission lines **(112)** or is connected to the one transmission line via a dielectric **(204** or **304)** and forms a capacitor therewith. The coupler further has a conductive interconnect member **(200** or **300)** that is connected to the contact member and also to the other transmission line **(108)** either directly (FIG. **3**) or via a second conductive contact member **(202)** (FIG. **2**). The conductive interconnect member is dimensioned to have an inductive impedance at the frequency of the signals that equals and hence cancels out, the capacitive impedance of the one or two capacitors formed by the one or two contact members. The coupler therefore resonates at the signal frequency and relative to conventional capacitive coupling achieves a low-loss interconnection over large gaps while requiring only small capacitance to do so.

10 Claims, 3 Drawing Sheets



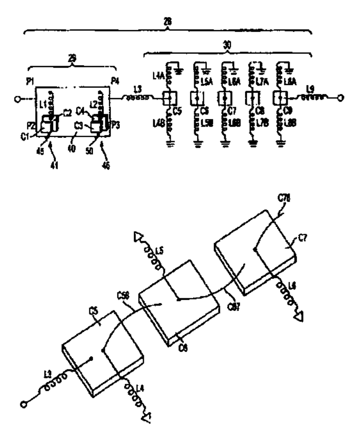
6,317,013 November 13, 2001

DELAY LINE FILTER

Inventor: Rafi Hershtlg (Salisbury, MD, US)
Assignee: K & L Microwave Incorporated (Salisbury, MD, US)
Filed: June 14, 2000.

Abstract—A filter, for use with a delay compensating circuit in a delay line filter, formed from co-located capacitors. The capacitors may be formed as traces disposed on a circuit card and co-located to provide capacitive coupling to each other and ground. Proximity coupling wires are connected at one end to capacitive traces and at the other end hang in mid-air above the next adjacent capacitive trace. The distance between each proximity coupling wire and the neighboring capacitive trace can be varied to control the capacitance coupling between neighboring capacitive traces. The filter is thus tuned by controlling the distances between the proximity coupling wires and by squeezing or stretching the inductors. The shunt coils control the frequency of the filter, while the series of capacitive traces control the bandwidth.

5 Claims, 34 Drawing Sheets



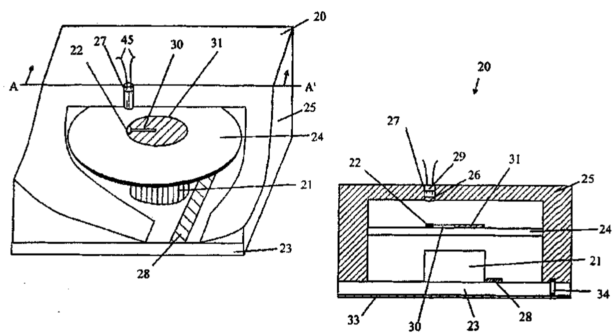
6,317,017 November 13, 2001

RESONATOR HAVING A VARIABLE RESONANCE FREQUENCY

Inventor: Tsutomu Takenaka (Tokorozawa, JP)
Assignee: Agilent Technologies, Inc. (Palo Alto, CA, US)
Filed: October 21, 1999.

***Abstract*—**A resonator having a variable resonance frequency. The resonator includes a cavity enclosed by a conducting wall. A resonating element and a conductive plate are located within the cavity. A photoconductive element is connected between two points on the conductive plate. The resonator also includes a light source for irradiating the photoconductive element with light of the predetermined wavelength. In the preferred embodiment, the conductive plate is circular and includes a gap, the photoconductive element connecting two points on the gap and the resonating element is a cylindrical dielectric resonator element having a $TE_{01\delta}$ mode electromagnetic filed distribution. The circular conductive plate is preferably placed parallel to the top surface of the cylindrical dielectric resonator substantially midway between the top surface and the inner surface of the conducting wall. The diameter of the circular plate is preferably greater than that of the cylindrical dielectric resonator. In one embodiment of the present invention, the photoconductive element includes first and second photoconductive regions, the first photoconductive region connecting first and second points on the conductive plate and the second photoconductive region connecting third and fourth points on the conductive plate. In this embodiment, the light source includes first and second light emitting elements, for respectively illuminating said first and second photoconductive regions. The magnitude of the change in resonance frequency induced by illuminating the photoconductive region can be altered by adjusting the relative position of the photoconductive element and the light source.

9 Claims, 3 Drawing Sheets



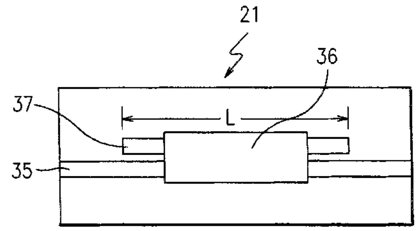
6,317,233 November 13, 2001

OPTICAL POWER EQUALIZER IN WDM OPTICAL COMMUNICATION SYSTEM AND VARIABLE ATTENUATOR FOR USE THEREIN

Inventor: Yung-Sung son (Kyungki-do, KR)
Assignee: LG Electronics Inc. (Seoul, KR)
Filed: March 2, 1999.

***Abstract*—**Optical power equalizer in a WDM optical communication system which can tune an optical power down to a desired extent and a variable optical attenuator for use therein, optical power equalizer including a variable optical attenuator for reducing a power of an optical signal to a given level, an optical coupler for detecting a portion of signal proportional to an output of the variable optical attenuator and an optical power monitor for receiving an output of the optical coupler and generating an electrical control signal for controlling an output of the variable optical attenuator; and the variable optical attenuator including two asymmetric optical waveguides adjacent to each other to form a directional coupler and a thermooptic electrode for varying the asymmetry of the asymmetric optical waveguides, thereby attenuating an optical power of an optical communication system.

7 Claims, 13 Drawing Sheets



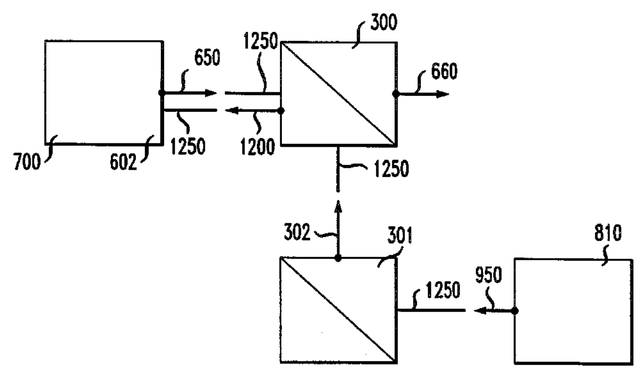
6,317,527 November 13, 2001

OPTICAL ISOLATOR AND CIRCULATOR

Inventor: Rao V. Yelamarty (Allentown, PA, US)
Assignee: Agere Systems Optoelectronics Guardian Corp. (Allentown, PA, US)
Filed: April 16, 1999.

***Abstract*—**An optical device and method for bidirectional communication in both high and low bit rate applications simultaneously using a polarization-sensitive beam splitting cube and optical port assemblies. The device provides optical isolation for a transmitting laser optic source and provides optical reflection of an optical beam to a receiver, simultaneously, over a single fiber optic link.

28 Claims, 6 Drawing Sheets



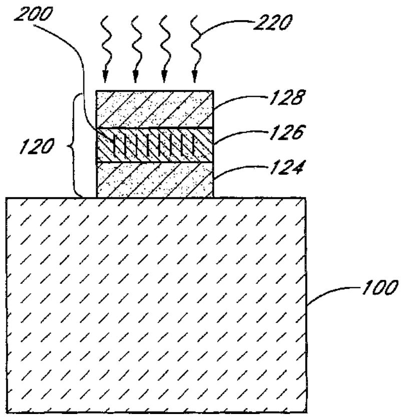
6,317,528 November 13, 2001

TEMPERATURE COMPENSATED INTEGRATED PLANAR BRAGG GRATING AND METHOD OF FORMATION

Inventors: Alka K. Gadkaree (Big Flats, NY, US) and Kishor P. Gadkaree (Big Flats, NY, US).
Assignee: Corning Incorporated (Corning, NY, US)
Filed: August 23, 1999.

***Abstract*—**An integrated planar Bragg grating is fabricated by depositing layers of material onto a negative expansion substrate to form a waveguide, which is held in mechanical tension with the substrate. A Bragg grating is then formed in the waveguide. As the temperature of the waveguide increases, the mechanical tension between waveguide and the substrate is relieved, such that the peak reflection wavelength of the Bragg grating remains nearly constant.

41 Claims, 2 Drawing Sheets



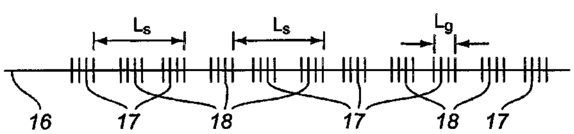
6,317,539 November 13, 2001

INTERLEAVED SAMPLED AND CHIRPED OPTICAL WAVEGUIDE GRATINGS FOR WDM CHANNEL OPERATIONS AND RESULTING DEVICES

Inventors: Wel-Hung Loh (San Jose, CA, US), Feng-Qing Zhou (San Jose, CA, US), and Jing-Jong Pan (Milpitas, CA, US).
Assignee: JDS Uniphase Corporation (San Jose, CA, US)
Filed: September 17, 1999.

***Abstract*—**The present invention provides for an optical waveguide device comprising a gratings, primarily in the form of fiber Bragg gratings, which are sampled, interleaved and chirped to achieve different functions. By interleaving sampled fiber Bragg gratings, each with a grating period which differs from the others by an amount corresponding to a multiple of a channel spacing, a predetermined and useful optical spectrum can be produced for the optical waveguide device. By making the sample periods for the fiber Bragg gratings different from each other, the resulting reflection spectrum has missing reflection peaks. A bandpass filter can be effectively created. Furthermore, by discretely varying the grating periods of sampled fiber Bragg gratings at intervals along the optical fiber containing the gratings, a more uniform optical spectrum is produced for the optical waveguide device. Finally, by chirping the sampling function of a sampled and chirped fiber Bragg grating, compensation for both dispersion and dispersion slope of a transmission fiber can be achieved.

44 Claims, 10 Drawing Sheets



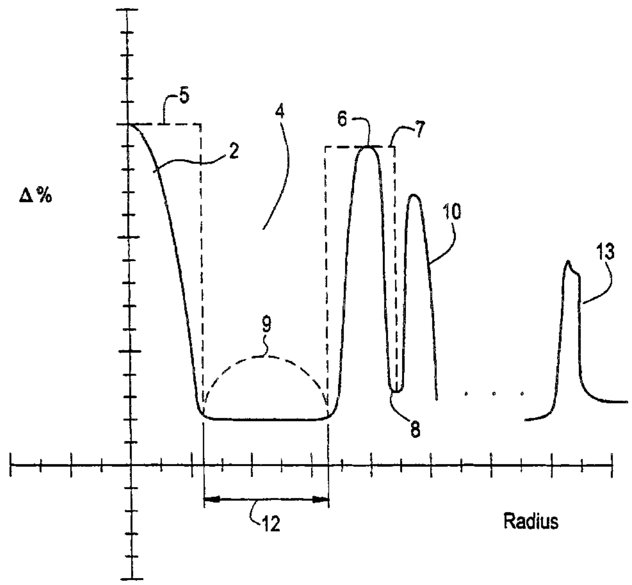
6,317,552 November 13, 2001

DISPERSION MANAGED OPTICAL WAVEGUIDE FIBER

Inventor: George E. Berkey (Pine City, NY, US)
Assignee: Corning Incorporated (Corning, NY, US)
Filed: July 23, 1998.

***Abstract*—**Disclosed is a single mode optical waveguide fiber designated for compensating for positive dispersion in optical telecommunications systems. A key characteristic of the invention is that the novel dispersion compensating waveguide, viz., a waveguide having large negative dispersion, contains no dopants, such as fluorine, which lower the refractive index of silica. A refractive index profile design which includes a high refractive index center segment **(5)** surrounded by a plurality of alternating high **(6, 10, 13)** and low refractive index segments, provides a dispersion compensation fiber which has the optical properties required for the system to be compensated without sacrificing bend resistance, increasing splicing loss, or elevating polarization mode dispersion.

12 Claims, 5 Drawing Sheets



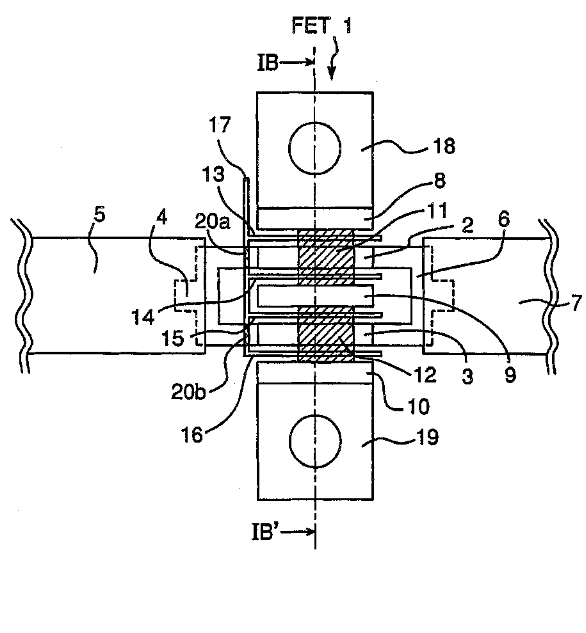
6,320,476 November 20, 2001

MILLIMETER-BAND SEMICONDUCTOR SWITCHING CIRCUIT

Inventor: Yoshihiro Tsukahara (Tokyo, JP)
Assignee: Mitsubishi Denki Kabushiki Kaisha (Tokyo, JP)
Filed: October 12, 1999.

***Abstract*—**A semiconductor switch includes parallel connected FETs, each FET having gate electrodes interleaved with first and second electrodes on a semiconductor substrate. An electrode interconnect connects, in a lengthwise direction of the first electrodes, mutually adjacent first electrodes. A further electrode interconnect connects second electrode interconnect. A ground line connects to ground at least two of the second electrodes at the outside-most positions of the second electrodes.

17 Claims, 15 Drawing Sheets



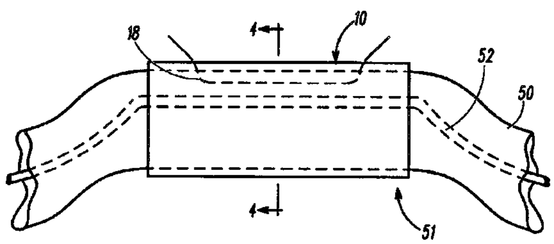
6,320,477 November 20, 2001

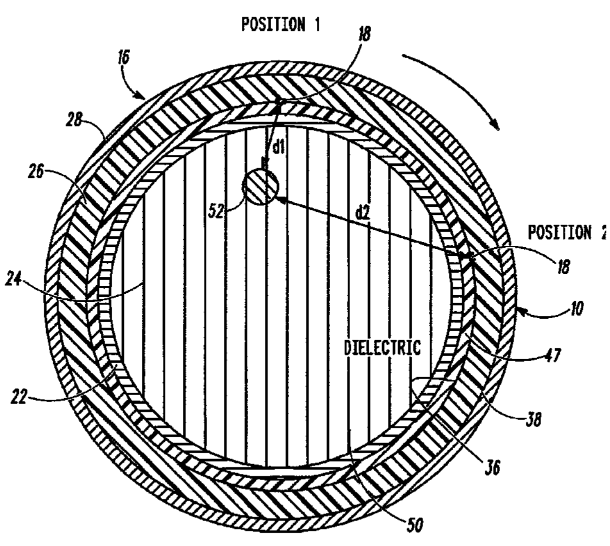
ADJUSTABLE OFF-CENTER COAXIAL COUPLER

Inventors: Robert D. Lithgow (Schaumburg, IL, US), Hong Gan (Vernon Hills, IL, US), and Miles Tusa (Crystal Lake, IL, US).
Assignee: Motorola, Inc.(Schaumburg, IL, US)
Filed: May 4, 2000.

Abstract**—**An energy coupler **(10)** includes a movably adjustable energy coupling sleeve **(16)**, and a coupling transmission line **(18)** operatively coupled to the movably adjustable energy coupling sleeve **(16)** to provide adjustable coefficient coupling with a transmission line **(14)**, such as a coaxial transmission line. In one embodiment, the movably adjustable energy coupling sleeve **(16)** is configured to rotatably move to provide selectable energy coupling with the coaxial transmission line **(14)**.

11 Claims, 3 Drawing Sheets





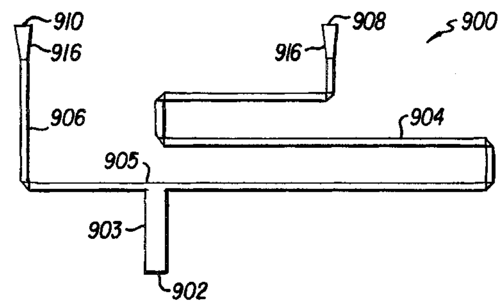
6,320,478 November. 20, 2001

POWER DIVIDER FOR HARMONICALLY RICH WAVEFORMS

Inventor: William Herbert Sims, III (Decatur, AL, US)
Assignee: The United States of America as represented by the Administrator of the National Aeronautics and Space Administration (Washington, DC, US)
Filed: October 29, 1998.

Abstract**—**A power divider divides an RF signal into two output signals having a phase difference of 180° or a multiple thereof. When the RF signal is a square wave or another harmonically rich signal, the phases of the fundamental and the harmonics have the proper relationship. The divider can be implemented in the form of microstrips on a board, with one of the output microstrips having several bends to provide a different electrical length from the other.

20 Claims, 8 Drawing Sheets



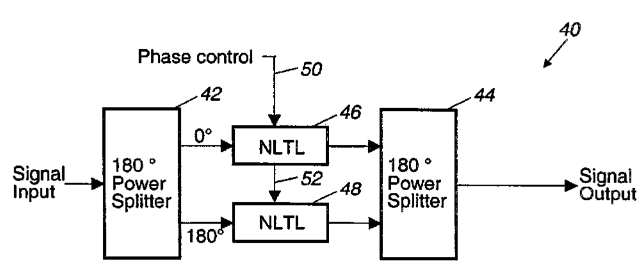
6,320,480 November 20, 2001

WIDEBAND LOW-LOSS VARIABLE DELAY LINE AND PHASE SHIFTER

Inventors: Mark Kintis (Manhattan Beach, CA, US), Daniel K. Ko (Monterey Park, CA, US), and Stephen A. Maas (Long Beach, CA, US).
Assignee: TRW Inc. (Redondo Beach, CA, US)
Filed: October 26, 1999.

Abstract**—**A programmable phase shifter **(20, 40, 54, 60 62)** includes a variable delay line formed from a nonlinear transmission line (NLTL) **(26, 28, 46, 28)**, which enables the device to be used in applications where the frequency of the input signal varies. A variable DC bias applied to the NLTL **(26, 28, 46, 48)** varies the NLTLs phase velocity and delay. Since the characteristic impedance of a transmission line changes as a function of the DC bias, the input voltage standing wave ratio (VSWR) also changes. In order to compensate for the change in the input VSWR, a pair of NLTL's **(26, 28, 46, 48)** are coupled at the input and output to a pair of hybrid couplers **(22, 42)**. In an alternate embodiment of the invention, the hybrid couplers **(22, 24)** are replaced with 180° power splitters **(42, 44)** in order to reduce distortion of the device. In other embodiments of the invention **(40, 54)**, a nonlinear transmission lines are used to form both discretely variable and continuously variable digital phase shifters **(60, 62)**.

13 Claims, 5 Drawing Sheets



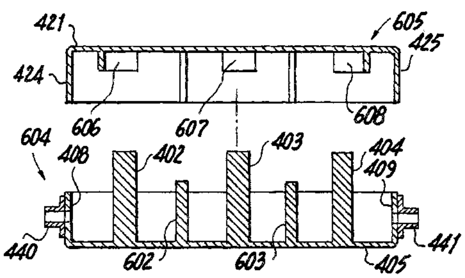
6,320,482 November 20, 2001

HIGH FREQUENCY FILTER CONSISTING OF INTEGRAL BODIES

Inventors: Jouni Ala-Kojola (Kempele, FI), Kari Lohtander (Oulunsalo, FI), Esa Mikkonen (Oulu, FI) , and Juha Korpela (Kempele, FI).
Assignee: LK-Product Oy (Kempele, FI)
Filed: June. 8, 1999.

***Abstract*—**A resonator or a filter consisting of resonators comprises an inner conductor or conductors and an outer conductor enclosing the inner conductor or conductors. It comprises a first part **(201, 301, 401, 604, 701)** and a second part **(202, 302, 420, 501, 605, 702)**, of which the first part comprises at least a part of the inner conductor or conductors **(203, 303, 402, 404, 703, 704, 705, 706, 707)** and a part of the outer conductor **(204, 205, 304, 305, 405, 406, 407, 408, 409)**, which is integral with the inner conductor parts and made of the same material and of which the second part comprises such a part of the outer conductor **(206, 207, 304, 305, 421, 422, 423, 424, 425)** which, when connected to the first part, forms a continuous outer conductor enclosing the inner conductor.

6 Claims, 4 Drawing Sheets



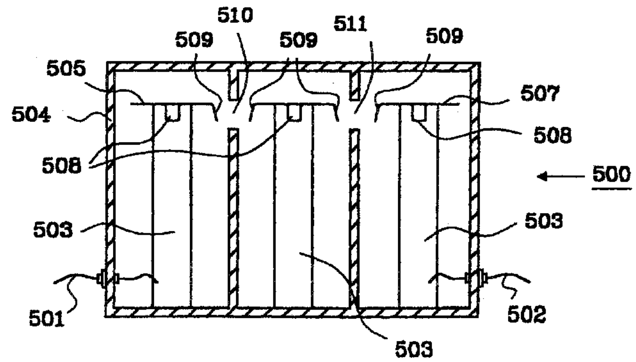
6,320,483 November 20, 2001

MULTI SURFACE COUPLED COAXIAL RESONATOR

Inventors: Tuomo Raty (Raahe, FI) and Antti Kanervo (Raahe, FI).
Assignee: Allgon AB (Akersberga,SE)
Filed: March 30, 2000.

***Abstract*—**The invention relates to an air-insulated coaxial resonator, which is particularly suitable for a structural part in duplex filters. The resonator has an inner conductor **(301)** extended at one end, so that it forms extra capacitance with the cover **(303)** of the resonator and the upper part **(302y)** of the outer conductor. Because of the extra capacitance, a resonator of a certain frequency is shorter than a corresponding quarter-wave resonator. Because of this it is also mechanically stronger and is more stable in its properties. The extension of the inner conductor and the shortening of the construction also have a dissipation-reducing effect. The extension **(302, 305, 306a, 306b)** can also be used for tuning the resonator and for coupling to the adjacent circuit elements. In a construction according to the invention, a third harmonic of the basic frequency component does not occur, which is a remarkable advantage in the manufacture of filters.

10 Claims, 2 Drawing Sheets



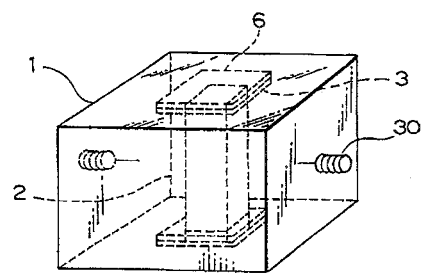
6,320,484 November 20, 2001

HIGH FREQUENCY DIELECTRIC FILTER

Inventors: Mitsuru Furuya (Tokyo, JP) and Yoshiyasu Yokoyama (Tochigi, JP).
Assignee: NEC Corporation (Tokyo, JP)
Filed: November 30, 1999.

***Abstract*—**The present invention provides a high frequency dielectric filter which can realize high stability, the least loss of functionality and mass-productiveness. In a high frequency dielectric filter adopting a TM mode, a resonator fixing plate 3 is used for fixing a dielectric resonator 2 and a case 1 and hence, they are firmly fixed both in the longitudinal direction and the lateral direction of the resonator. Accordingly, a high frequency dielectric filter which is stable against vibration and impact is provided.

9 Claims, 7 Drawing Sheets



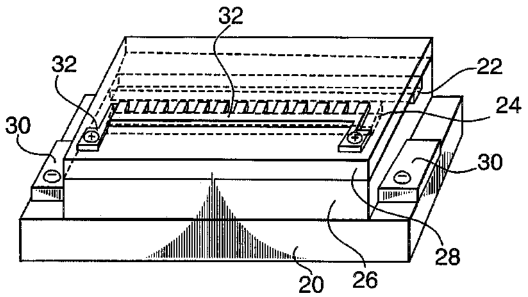
6,320,990 November 20, 2001

HIGH-PERFORMANCE ELECTRO-OPTIC INTENSITY MODULATOR USING POLYMERIC WAVEGUIDES AND GRATING MODULATION

Inventor: De-Gul Sun (Ottawa, CA)
Assignee: Nu-Wave Photonics, Inc. (Ottawa, CA)
Filed: March 2, 2000.

***Abstract*—**A high-performance electro-optic intensity modular using two polymeric waveguides having a high extinction-ratio modulation process is implemented by the coupling-out effect of induced grating modulation. The two waveguides can be either single-mode or multi-mode, even highly multimode. The inducing of a modulated grating-coupler in a waveguide channel makes the coupling between two waveguides become unidirectional and the coupling efficiency can be achieved to a very high value in theory. The two waveguide channels in this intensity modulator may have large dimensions, so the device can support either single-mode or multi-mode operation. The electro-optic waveguide intensity modulator may be used either as a single optical modulator/switch or as a waveguide modulator/switch array for fiber-optic communication.

4 Claims, 1 Drawing Sheet



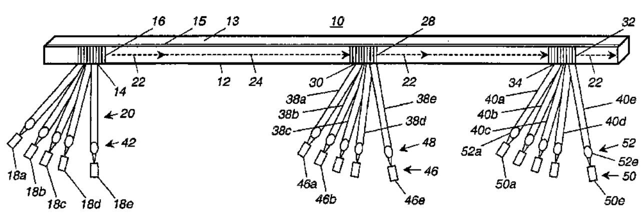
6,321,001 November 20, 2001

WAVELENGTH DIVISION MULTIPLEXED OPTICAL COMMUNICATION SYSTEM

Inventor: Donald G. Heflinger (Torrance, CA, US)
Assignee: TRW Inc (Redondo Beach, CA,US)
Filed: June 18, 1999.

Abstract**—**A wavelength division multiplexed optical communication system comprises an optical waveguide having a plurality of gratings, each defining a node. A first grating is disposed at a first node couples impinging light at a plurality of preselected wavelengths into the waveguide. The coupled light propagates through the waveguide and is emitted at a second and at a third grating in directions corresponding to each of the preselected wavelengths. A plurality of optical sources is arranged proximate the first node, each source transmitting an optical signal at a preselected wavelength that differs from that transmitted by the other sources and arranged to transmit light to the first grating. Optical detectors are disposed proximate the second and the third nodes and positioned in directions corresponding to the emitted light. Thus each detector detects one of the preselected wave-lengths. This constitutes a broadcast type of communication system.

19 Claims, 1 Drawing Sheet



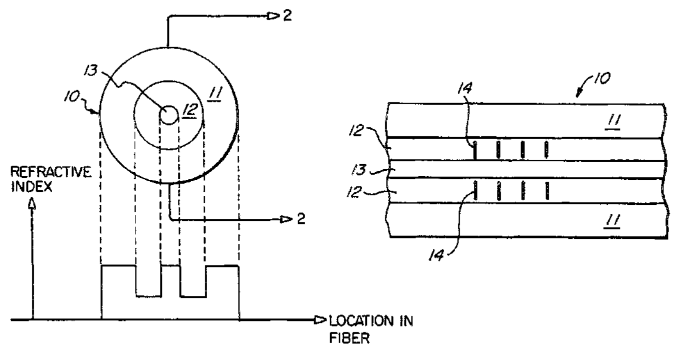
6,321,007 November 20, 2001

OPTICAL FIBER HAVING A BRAGG GRATING FORMED IN ITS CLADDING

Inventor: Paul E. Sanders (Madison, CT, US)
Assignee: CIDRA Corporation (Wallingford, CT, US)
Filed: November 24, 1999.

Abstract**—**A single mode optical fiber, having a pure silica core and a cladding and having a Bragg grating in along a length of some of the cladding, providing reflectivity in some of the cladding but not in the core and a method for making same. Because the core is pure silica, it is unaffected by exposure to ultraviolet light and so the process of imprinting a Bragg grating does not affect the refractive index of the core. The portion of the cladding in which the Bragg grating is to be imprinted is a glass containing an index-lowering dopant, such as fluorine, as well as a photosensitizing dopant, such as germanium. Exposure to ultraviolet light therefore forms a Bragg grating in a portion of the cladding, but not in the core, providing reflectivity in the cladding, but not in the core. A second portion of cladding can also be provided, surrounding the portion doped with the photosensitizing dopant. The second portion of the cladding is an outer cladding, surrounding the doped portion, which abuts the core.

20 Claims, 3 Drawing Sheets



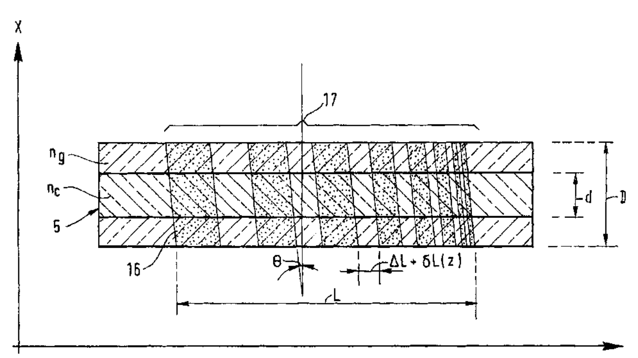
6,321,008 November 20, 2001

FILTER OPTICAL WAVEGUIDE WITH INCLINATION AND LINEAR CHIRP

Inventors: Isabelle Riant (Palaiseau, FR) and Pierre Sansonetti (Palaiseau, FR).
Assignee: Alcatel (Paris, FR)
Filed: January 24, 2000.

Abstract**—**An angled Bragg grating optical waveguide section adjusts the spectral response of a transmission filter in an optical waveguide or in an optical fiber. To smooth the response of the filter, which is subject to modulation due to coupling to the various cladding modes, the pitch of the Bragg grating is caused to vary in a linear fashion along the length of the filter. To adapt the attenuation band to a required band, the cladding of the optical fiber is doped with a photosensitive material so that the grating is also formed in the cladding. The photosensitivity of the cladding is advantageously greater than that of the core, in a ratio in the order of 5:1.

13 Claims, 4 Drawing Sheets



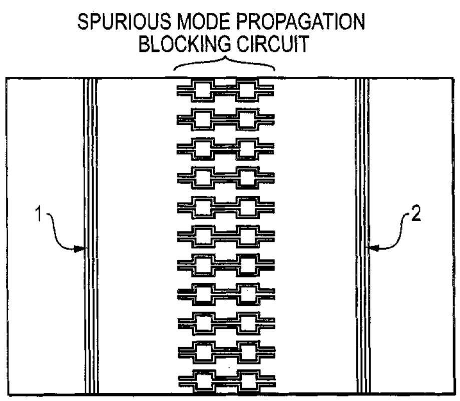
6,323,740 November 27, 2001

HIGH-FREQUENCY CIRCUIT DEVICE AND COMMUNICATION APPARATUS

Inventors: Yohei Ishikawa (Kyoto, JP), Kenichi Iio (Nagaokakyo, JP), Takatoshi Kato (Mino, JP), and Koichi Sakamoto (Otsu, JP).
Assignee: Murata Manufacturing Co., Ltd. (JP)
Filed: July 16, 1999.

Abstract—Electrodes are formed on both top and bottom surfaces of a dielectric plate and grounded coplanar lines, as transmission lines, are formed on the top surface of the dielectric plate. A plurality of micro-strip lines, each composed of high-impedance lines and low-impedance lines alternately connected in series, is arranged at a pitch shorter than the wavelength of a wave traveling along the grounded coplanar lines. A spurious mode propagation blocking circuit thus constructed prevents a spurious mode wave, such as a parallel-plate mode, from traveling.

37 Claims, 32 Drawing Sheets



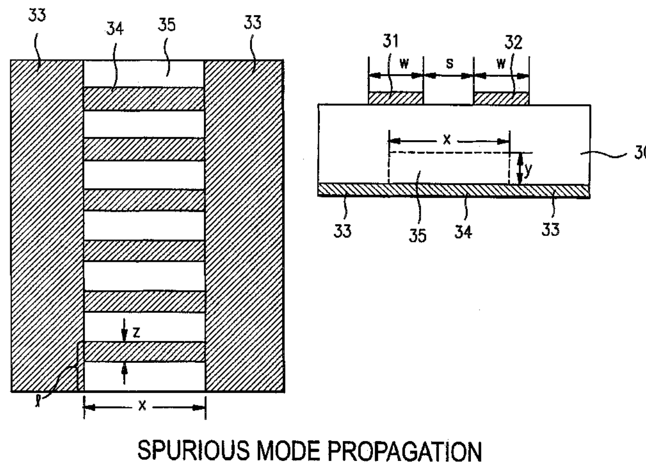
6,323,741 November 27, 2001

MICROSTRIP COUPLER WITH A LONGITUDINAL RECESS

Inventor: Dong Wook Kim (Seoul, KR)
Assignee: LG Electronics Inc. (Seoul, KR)
Filed: October 12, 1999.

Abstract—Microstrip coupler and method for fabricating the same, which can improve a directivity while does not affect to an active device disposed on the same substrate, the microstrip coupler, including an insulating substrate having a dielectric constant, one pair of coupled microstrip lines having a width spaced a distance from each other, extended in a longitudinal direction and disposed on one side of the insulating substrate and a recess formed in the insulating substrate on a side of a grounded member opposite to the microstrip lines with a width and a depth disposed in the longitudinal direction.

6 Claims, 6 Drawing Sheets



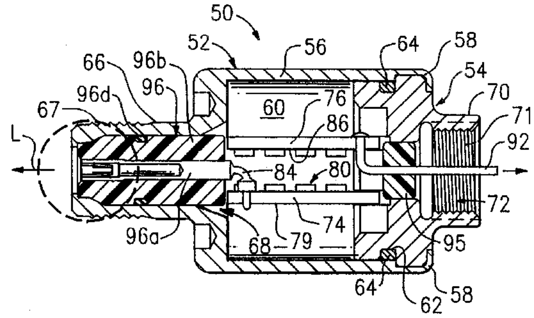
6,323,743 November 27, 2001

ELECTRONIC FILTER ASSEMBLY

Inventors: Martin L. Zelenz (DeWitt, NY, US), Jerry M. Gould (Liverpool, NY, US), and Andrew F. Tresness (Manlius, NY, US).
Assignee: Tresness Irrevocable Patent Trust (Syracuse, NY, US)
Filed: August 24, 1999.

Abstract—A filter assembly, comprising first and second terminal caps in opposing relation to each other. The caps are physically and electrically coupled to each other. First and second circuit boards are physically coupled to the first cap. The first circuit board includes—(i) front and rear surfaces, (ii) a first circuit located on either or both of the front and rear surfaces, (iii) a ground lead connected to the first circuit, and (iv) a first electrical terminal coupled to the first circuit. The second circuit board includes-(i) front and rear surfaces, (ii) a second circuit located on either or both of the front and rear surfaces, (iii) a ground lead connected to the second circuit and (iv) a second electrical terminal coupled to the second circuit. The first and second circuits are electrically coupled to each other and each are electrically coupled to the first terminal cap via the ground leads. The circuit boards are positioned substantially parallel to each other. The terminals extend into and are operatively supported inside the terminal caps, respectively.

29 Claims, 3 Drawing Sheets



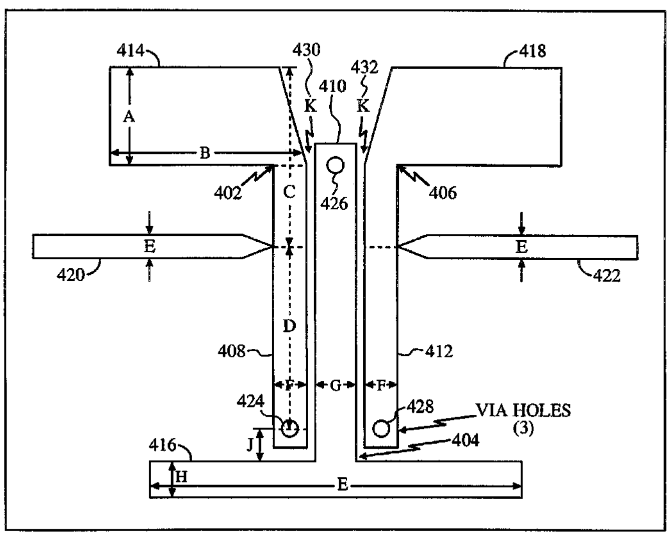
6,323,745 November 27, 2001

PLANAR BANDPASS FILTER

Inventor: Stanley S. Toncich (San Diego, CA, US)
Assignee: Qualcomm Inc. (San Diego, CA, US)
Filed: September 28, 1999.

***Abstract*—**A planner bandpass filter that comprises a substrate having a ground plane on one side and a plurality of resonators on the other side. Each resonator includes an elongated inductive portion and a capacitive portion. The elongated inductive portions are coupled through the substrate at the end opposite of the capacitive portion to the ground plane. The planar bandpass filter also includes a first tap and a second tap. The first tap is connected to a first elongated portion to serve as an input to the bandpass filter. The second tap is connected to a last elongated portion to serve as an output to the bandpass filter.

19 Claims, 6 Drawing Sheets



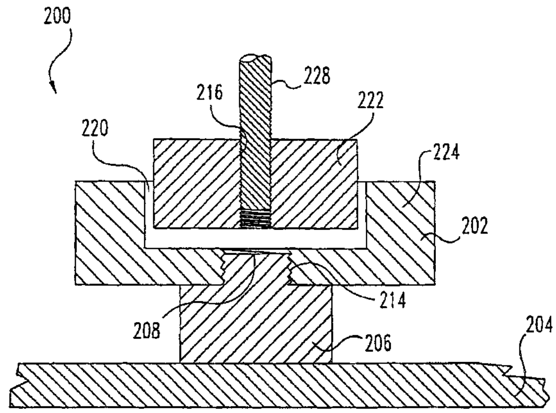
6,323,746 November 27, 2001

DIELECTRIC MOUNTING SYSTEM

Inventors: Lee A. Prager (Berlin, MA, US), Timothy M. Ebling (Naples, ME, US), and Thomas W. Godan (Old Orchard Beach, ME, US).
Assignee: Control Devices, Inc. (Standish, ME, US)
Filed: November 17, 1999.

***Abstract*—**A dielectric resonator system having a dielectric element and a purified alumina attachment assembly both housed within a metallic resonant casing. Attachment assembly is at least 99.5% pure alumina. Attachment assembly couples dielectric element to the casing. Dielectric element is an internally threaded ring or disk. Attachment assembly includes an externally threaded alumina support member coupled to the internally threaded dielectric element.

27 Claims, 9 Drawing Sheets



6,324,317 November 27, 2001

WAVELENGTH DIVISION MULTIPLEXING OPTICAL TRANSMISSION SYSTEM

Inventors: Toshiki Tanaka (Kawasaki, JP) and Takao Naito (Kawasaki, JP).
Assignee: Fujitsu Limited (Kawasaki, JP)
Filed: November 30, 1999.

***Abstract*—**An object of the present invention is to provide a WDM optical transmission system with an excellent transmission characteristic by employing a hybrid transmission line which is formed by combining under optimal conditions an optical fiber having positive wavelength dispersion and an optical fiber having negative wavelength dispersion. According to the WDM optical transmission system, an optical transmitter station, optical amplifiers and an optical receiver station are interconnected over an optical fiber transmission line. The optical fiber transmission line has an inter-repeater segment formed with a hybrid transmission line composed of a 1.3 μm zero-dispersion SMF and an RDF and an inter-repeater segment formed with a DCF for compensating for cumulative wavelength dispersion generated in the hybrid transmission line. As the conditions for setting the hybrid transmission line, a ratio of the length of the RDF to the length of the inter-repeater segment must be 20% or more and 40% or less. Consequently, an influence due to a nonlinear effect or transmission loss in the hybrid transmission line can be minimized to thereby improve a transmission characteristic.

25 Claims, 15 Drawing Sheets