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.

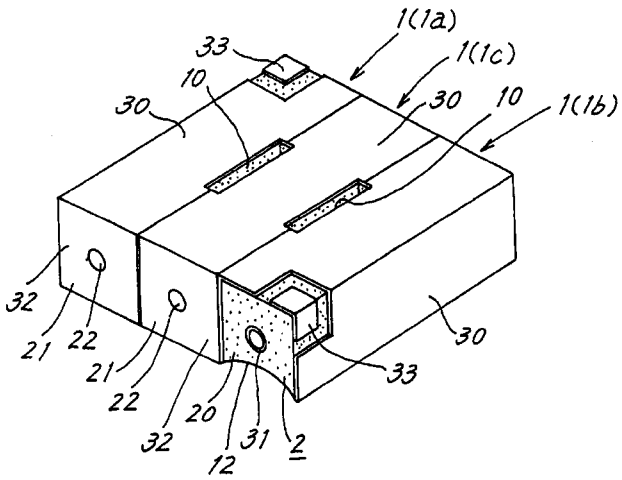
6,154,951 Dec. 5, 2000

Dielectric Filter and Process for Producing Same

Inventors: Atsushi Ito and Satoru Ota.
Assignees: Sanyo Electric Co., Ltd. and Sanyo Electronic Components Co., Ltd.
Filed: Dec. 9, 1998.

***Abstract*—**A process for producing a dielectric filter by bonding coaxial dielectric resonators of predetermined size as arranged side by side. The process comprises forming interstage coupling windows by removing an outer conductor layer from the same region of each of adjoining surfaces of the resonators to be adjacent to each other, and bonding the resonators as arranged side by side in proximity to each other on a smooth-surfaced table with an electrically conductive bonding material applied to at least one of the outer conductive layers remaining on the adjoining surfaces.

7 Claims, 9 Drawing Sheets



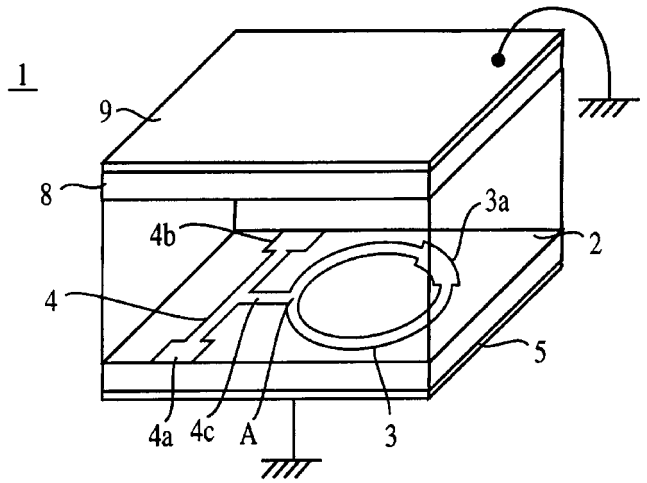
6,157,274 Dec. 5, 2000

Band Elimination Filter and Duplexer

Inventors: Hitoshi Tada and Hideyuki Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 16, 1998.

***Abstract*—**The invention provides a band elimination filter, comprising: a ring shaped resonator adapted to resonate in two orthogonal modes combined together; one input–output terminal electrically connected to said ring shaped resonator; and a perturbation portion disposed in said ring shaped resonator. The perturbation portion may be composed of a portion of said ring shaped resonator at which a pattern width is different from the other portion of said ring shaped resonator. Or, the perturbation portion may be composed a lumped constant passive element.

13 Claims, 8 Drawing Sheets



6,157,753 Dec. 5, 2000

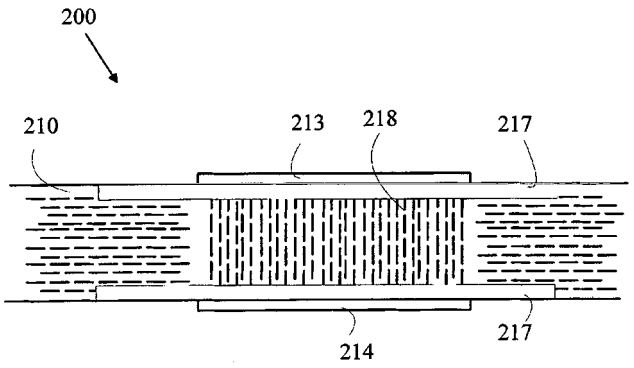
Programmable Light Path Device

Inventors: Douglas M. Baney and Wayne V. Sorin.
Assignee: Agilent Technologies, Inc.
Filed: May 21, 1999.

***Abstract*—**A switchable waveguide having first and second states. In the first state, the waveguide guides light of a signal wavelength along a predetermined path. In the second state, no guiding of the light occurs. The waveguide includes a guide layer of a guide material having a first index of refraction in the absence of an electric field and a second index of refraction in the presence of the electric field. The electric field is generated in a portion of the guide layer by applying an appropriate electrical signal to a plurality of electrodes that define a guide region in the guide layer. The guide region has an index of refraction that is greater than that of the guide layer in regions adjacent to the guide region. The electrodes are separated from the guide region by a distance of at least one-half times the wavelength of the light being guided. The separation is maintained by arranging the electrodes such that the guide region is created at a location separated from the electrodes.

Publisher Item Identifier S 1531-1309(01)05872-X.

7 Claims, 3 Drawing Sheets



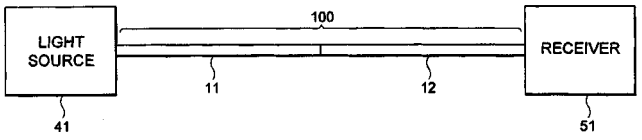
6,157,754 Dec. 5, 2000

Optical Transmission Line

Inventors: Eisuke Sasaoka and Takatoshi Kato.
Assignee: Sumitomo Electric Industries, Ltd.
Filed: May 11, 1998.

***Abstract*—**The present invention relates to an optical transmission line, applicable to Wave Division Multiplexing (WDM) transmission, having a structure for restraining optical transmission characteristics from deteriorating due to each of the occurrence of nonlinear optical phenomena and the wavelength dispersion. This optical transmission line comprises, at least, a first optical fiber having, as characteristics at the predetermined operating wavelength, a first effective area and a first dispersion slope; and a second optical fiber having, as characteristics at the predetermined operating wavelength, a second effective area smaller than the first effective area and a second dispersion slope smaller than the first dispersion slope. In particular, the second optical fiber contributes to suppressing the deterioration in its optical transmission characteristics in the whole optical transmission line.

39 Claims, 6 Drawing Sheets



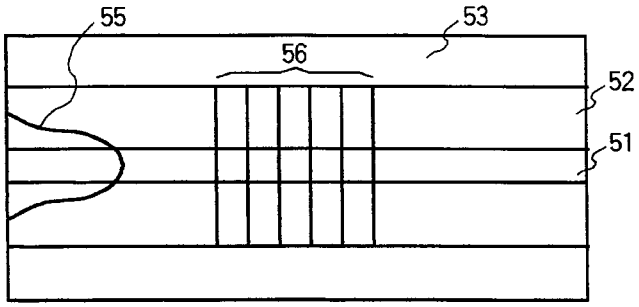
6,157,758 Dec. 5, 2000

Grating Optical Fiber, and Optical Fiber Base Material Suitable for Grating

Inventors: Jun Abe, Masayasu Nagaoka, Nobuyasu Mantoku, and Kazuo Koya.
Assignee: Shin-Etsu Chemical Co., Ltd.
Filed: Feb. 22, 1999.

***Abstract*—**A grating optical fiber comprises a core, a first clad layer formed around the core, and a second clad layer formed around the first clad. Germanium is doped in the core, while germanium and fluorine are doped in the first clad layer. Gratings are formed on both the core and the first clad layer. The difference between the indexes of refraction between the first and second clad layers is smaller than the difference between the indexes of refraction between the core and the first clad layer.

10 Claims, 9 Drawing Sheets



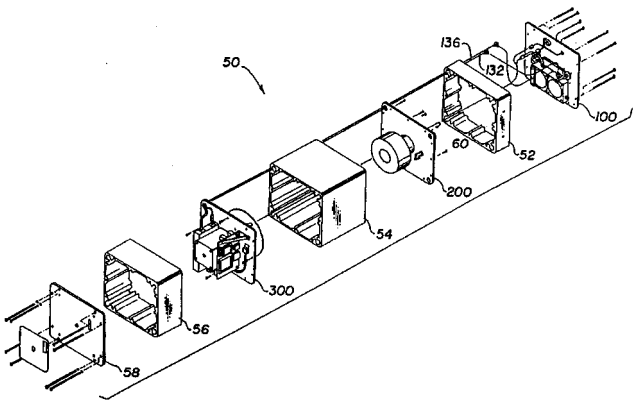
6,160,460 Dec. 12, 2000

Self-Tuning Resonant Cavity Filter

Inventors: John R. Hicks, David W. Allen, and Peter Mailandt.
Assignee: Allen Telecom Inc.
Filed: Apr. 13, 1998.

***Abstract*—**In one form of the invention, a resonant cavity filter (**50**) is disclosed, comprising an input port (**210**) for receiving an input signal, a dielectric resonator (**204**) in a cavity, the dielectric resonator operable to receive an input signal from the input port and further operable to produce an output signal at a resonant frequency of the cavity, an output port (**212**) operable to receive the output signal and a tuning plate (**308**) disposed in the cavity, the tuning plate coupled to a control means operable to cause movement of the tuning plate, thereby changing dimensions of the cavity, the control means operable to determine a frequency of the input signal, retrieve an expected tuning plate position from a memory (**514**) based on the frequency, and move the tuning plate to the expected position. Other systems, devices and methods are disclosed.

17 Claims, 14 Drawing Sheets



6,160,463 Dec. 12, 2000

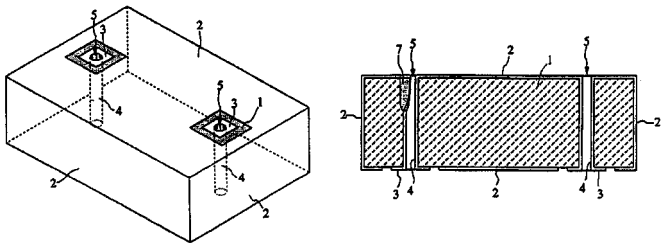
Dielectric Waveguide Resonator, Dielectric Waveguide Filter, and Method of Adjusting the Characteristics Thereof

Inventors: Shigeji Arakawa and Kikuo Tsunoda.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 16, 1999.

***Abstract*—**A conducting film is formed on a dielectric block in a dielectric waveguide resonator, and through-holes are formed in the dielectric block. The unloaded Q is set by selecting the outside dimensions of the dielectric block. The

resonance frequency is set by selecting the size and location of the through-holes as well as the outside dimensions of the dielectric block. Terminal electrodes are formed on the outer surface of the dielectric block. Coupling electrodes are formed on the inner surfaces of the through-holes. One end of each coupling electrode is connected to the corresponding terminal electrode and the other end of the coupling electrode may be connected to the conducting film formed on the outer surface of the dielectric block. Alternatively, the other end of the coupling electrode may be partially removed to adjust the amount of coupling; or may be completely removed so as to isolate the coupling electrode from the conducting film on the outer surface. The above-described structures increase the degree of freedom in the design of the characteristics, including the resonance frequency and unloaded Q, of the dielectric waveguide resonator. The invention also provides a dielectric waveguide filter with a simple coupling mechanism whereby it is possible to couple to an external circuit without having to use an additional member and without electromagnetic leakage.

7 Claims, 21 Drawing Sheets



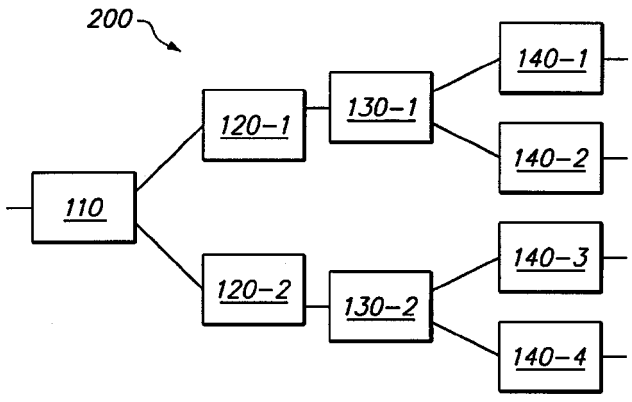
6,160,932 Dec. 12, 2000

Expandable Wavelength Division Multiplexer Based on Interferometric Devices

Inventors: Chi-hung Huang, Joseph Chon, and Sheau Sheng Chen.
Assignee: WaveSplitter Technologies, Inc.
Filed: Feb. 16, 1999.

***Abstract*—**A wavelength division multiplexer (WDM) utilizes cascaded interferometric devices, where the two output branches of interferometric devices in each new stage are each coupled to an additional stage of interferometric devices having the same wavelength separation or channel spacing, which suppresses the sidelobes of the signals from preceding stage of interferometric devices. In one embodiment, the interferometric devices are unbalanced Mach–Zehnder Interferometers.

18 Claims, 8 Drawing Sheets



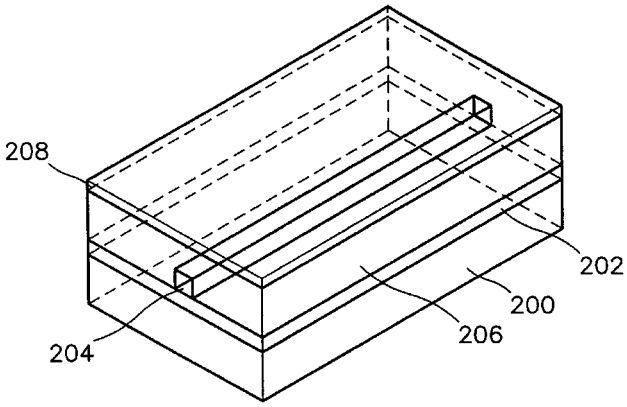
6,160,945 Dec. 12, 2000

Optical Waveguide Device for Loss Absorption and Fabrication Method Thereof

Inventors: Tae-hyung Rhee, Woo-hyuk Jang, Eun-ji Kim, and Yong-woo Lee.
Assignee: SamSung Electronics Co., Ltd.
Filed: Sep. 14, 1998.

***Abstract*—**An optical waveguide device for loss absorption, and a fabrication method thereof, are provided. The optical waveguide device for loss absorption includes: a substrate of a predetermined material; a lower cladding formed on the substrate; an optical waveguide formed on the lower cladding, and formed of a material having a refractive index greater than a refractive index of the lower cladding; an upper cladding formed so as to completely cover the optical waveguide; and an absorption layer formed of a material having refractive index greater than a refractive index of the upper cladding, and formed on the upper cladding to a thickness which can absorb a reflected or radiated optical signal. As described above, an absorption layer capable of absorbing light is formed in the waveguide device upon fabricating the optical waveguide, thus minimizing or removing loss due to reflection and radiation of an optical signal.

19 Claims, 6 Drawing Sheets



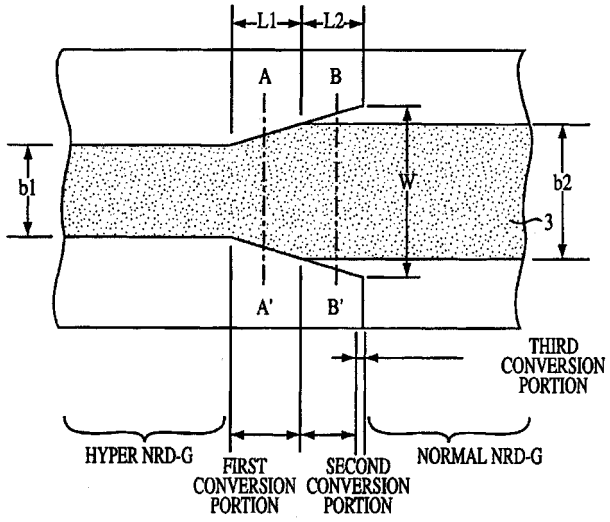
6,163,227 Dec. 19, 2000

Non Radiative Dielectric Waveguide Having a Portion for Line Conversion Between Different Types of Non Radiative Dielectric Waveguides

Inventors: Atsushi Saitoh, Toru Tanizaki, Hiroshi Nishida, Ikuo Takakuwa, and Yoshinori Taguchi.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 18, 1998.

***Abstract*—**In a millimeter wave module or the like having both a normal NRD guide and a hyper NRD guide, a conversion portion structure for non, radiative dielectric waveguides of different types has excellent conversion characteristics at the connection between the two types of NRD guides. In a first conversion portion, the width of a dielectric strip is changed from the width of a dielectric strip in the hyper NRD guide portion to the width of a dielectric strip in the normal NRD guide portion, grooves of approximately the same depth as grooves in the hyper NRD guide are provided extending as far as the second conversion portion, and in a third conversion portion, the width of these grooves widens perpendicular to the propagation direction of electromagnetic waves and parallel to the face of conductive plates. According to this structure, guide conversion can be achieved with low radiation in a predetermined frequency band.

9 Claims, 14 Drawing Sheets



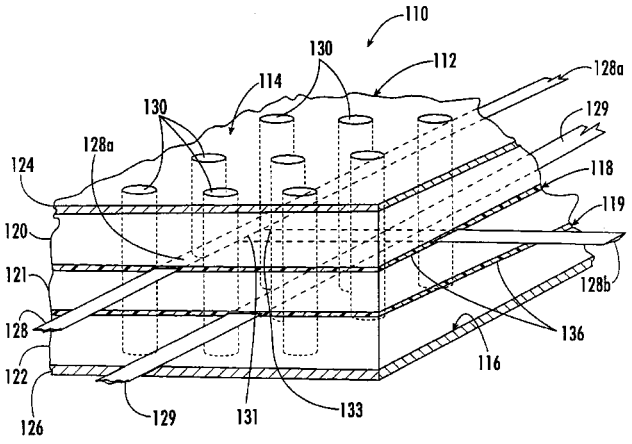
6,163,233 Dec. 19, 2000

Waveguide with Signal Track Cross-Over and Variable Features

Inventor: Calvin L. Adkins.
Assignee: Harris Corporation.
Filed: Jul. 30, 1998.

***Abstract*—**A waveguide structure and a method of forming a waveguide structure is disclosed. The waveguide structure includes at least three dielectric layers juxtapositioned together such that two layers are positioned as outer layers. At least two intermediate signal path layers are positioned between respective dielectric layers. The outer dielectric layers each include a ground layer to form opposing ground planes. A controlled impedance signal track is formed at each intermediate signal path layer and a plurality of conductive vias interconnect the ground planes.

40 Claims, 6 Drawing Sheets



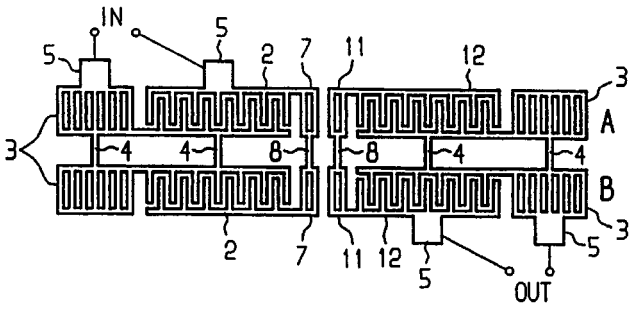
6,163,236 Dec. 19, 2000

Twin Dual Mode Filters with Reflectors Between Transducers Being Electrically Connected Between DMS Tracks

Inventor: Baier Thomas.
Assignee: Siemens Matsushita Components GmbH & Co.
Filed: Aug. 28, 1997.

***Abstract*—**Twin dual mode filter with DMS filters have an input and output transducer (**2; 12**) per DMS track (A, B) within reflectors (**3, 3**) and further reflectors (**7, 11**) between the transducers that are respectively interconnected to one of the transducers. The reflectors (**7, 11**) of the input or, respectively, output side are respectively connected to one another via interconnects (**8, 8**). The DMS tracks (A, B) are frequency-shifted relative to one another such that the high-frequency resonance of the low-frequency track (B) falls onto the low-frequency resonance of the high-frequency track (A).

16 Claims, 3 Drawing Sheets



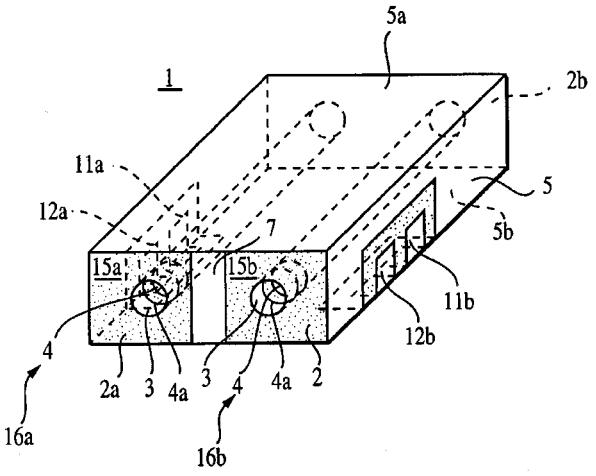
6,163,237 Dec. 19, 2000

Dielectric Filter and Dielectric Duplexer

Inventors: Jun Toda, Hideyuki Kato, and Haruo Matsumoto.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 16, 1998.

***Abstract*—**The invention provides a dielectric filter, comprising: a dielectric block having substantially rectangular shape, said dielectric block including a first and a second opposed to each other and a third and a fourth opposed to each other and extending between said first and second surfaces; a plurality of through holes extending between said first and second surfaces; an inner conductor provided on an inner surface of said through holes except for a nonconductive portion, said nonconductive portion being disposed on said inner surface of said through holes in the vicinity of said first surface of said dielectric block; an outer conductor provided on said third and fourth surfaces of said dielectric block; and a line conductor provided on said first surface of said dielectric block, a part of said outer conductor provided on said third surface of said dielectric block and a part of said outer conductor provided on said fourth surface of said dielectric block being connected to each other via said line conductor; thereby a plurality of resonators comprising a combination of a TEM mode resonator and a TE mode resonator, and a combination of a TEM mode resonator or a TM mode resonator being provided.

6 Claims, 6 Drawing Sheets



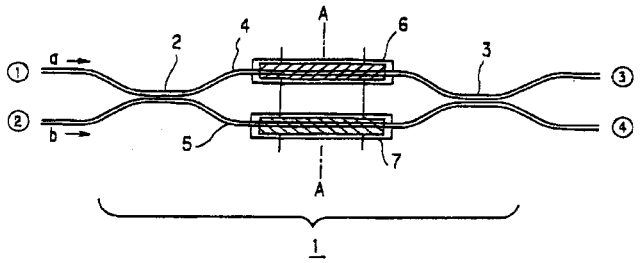
6,163,633 Dec. 19, 2000

Optical Waveguide Switch Having Peltier Junction Control Elements

Inventor: Tetsuji Ueda.
Assignee: NEC Corporation.
Filed: May 28, 1998.

***Abstract*—**A optical switch comprising: a substrate; and a Mach–Zehnder interferometer circuit provided on the substrate, the Mach–Zehnder interferometer circuit comprising two directional couplers and two optical transmission lines for connecting the directional couplers to each other; elements having Peltier effect provided respectively on the two optical transmission lines; and energizing means for energizing the elements in such a manner that heat is generated from one of the elements with absorption of heat being created in the other element. By virtue of the above construction, the optical switch can realize low power consumption, low extinction ratio, and low crosstalk.

16 Claims, 4 Drawing Sheets



a, b: TRANSMISSION LIGHTS
① TO ④ : PORTS
1 : MACH-ZEHNDER INTERFEROMETER CIRCUIT
2, 3 : DIRECTIONAL COUPLER
4 : ARM (OPTICAL WAVEGUIDE)
5 : ARM (OPTICAL WAVEGUIDE)
6 : PELTIER ELEMENT
7 : PELTIER ELEMENT

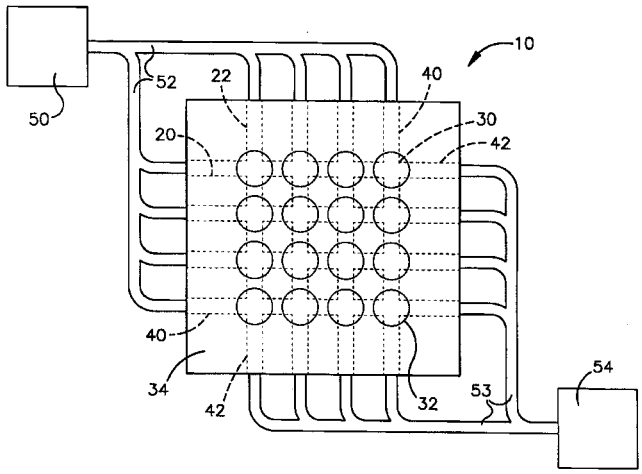
6,163,634 Dec. 19, 2000

Optical Switch

Inventor: Charles A. Mallon.
Assignee: TRW Inc.
Filed: Jun. 24, 1999.

***Abstract*—**An optical switch (**10**) comprises a body of resilient material (**12**) including resilient opaque material (**16**) and resilient light conducting material (**14**). The light conducting material (**14**) is arranged in rows (**20**) and columns (**22**) which intersect at junctures (**30**). At least one light transmitter (**50**) directs light into one end of the rows (**20**) and columns (**22**) and through the junctures (**30**). Each juncture (**30**) is deformable to modify the intensity of light transmitted through the juncture (**30**). At least one light receiver (**52**) receives the light transmitted through the juncture (**30**) and provides an output signal in response to the modified light intensity.

8 Claims, 2 Drawing Sheets



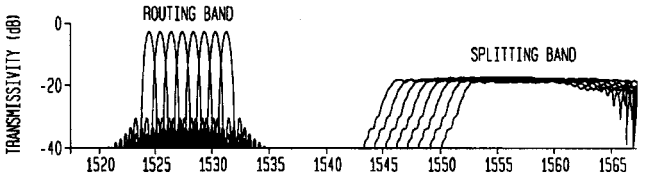
6,163,637 Dec. 19, 2000

Chirped Waveguide Grating Router as a Splitter/Router

Inventor: Martin Zirngibl.
Assignee: Lucent Technologies Inc.
Filed: Apr. 20, 1998.

***Abstract*—**A wavelength-dependent splitter/router is made by chirping a waveguide grating router, such that the path-length difference between pairs of adjacent grating arms is not a constant. With careful design, a device can be fabricated that acts as an optical splitter in one wavelength band and as an optical router in another wavelength band. The invention has applicability in optical networks, because it enables the overlaying of a wavelength-division-multiplexed (WDM) network (which relies on routers) with a broadcast type of network (which relies on splitters).

22 Claims, 6 Drawing Sheets



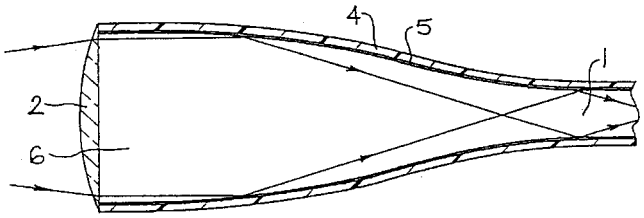
6,163,641 Dec. 19, 2000

Optical Waveguide for UV Transmission

Inventor: Harold Frederick Eastgate.
Filed: Jan. 3, 1997.

***Abstract*—**An optical waveguide for transmitting ultraviolet (UV) radiation, said waveguide including a tube (**4**), and a liquid core (**1**) filling said tube, said liquid core including a lithium or strontium salt, or mixture thereof.

23 Claims, 4 Drawing Sheets



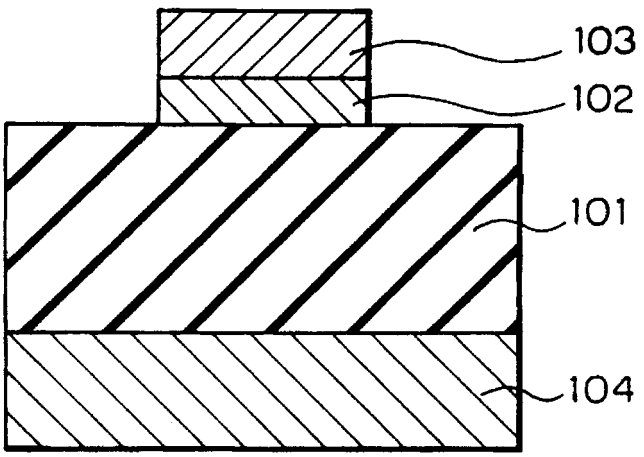
6,163,713 Dec. 19, 2000

High Frequency Transmission Line Capable of Improving an Intermodulation Distortion Characteristic in a High Frequency Device

Inventors: Katsumi Suzuki, Sadahiko Miura, Takayuki Inoue, Koji Muranaka, Hideaki Zama, Youichi Enomoto, Tadataka Morishita, and Shoji Tanaka.
Assignees: NEC Corporation, Sumitomo Electric Industries, Ltd., and International Superconductivity Technology Center.
Filed: Mar. 5, 1998.

***Abstract*—**In a high frequency transmission line having a dielectric substrate and a conductor line which is provided on the dielectric substrate for allowing electric current to flow therethrough, the conductor line has a nongrain-boundary oxide superconductor layer with twin walls but without grain boundaries. The high frequency transmission line is in the form of a plane circuit. It is preferable that an oriented oxide superconductor layer is provided between the dielectric substrate and the nongrain-boundary oxide superconductor layer.

10 Claims, 3 Drawing Sheets



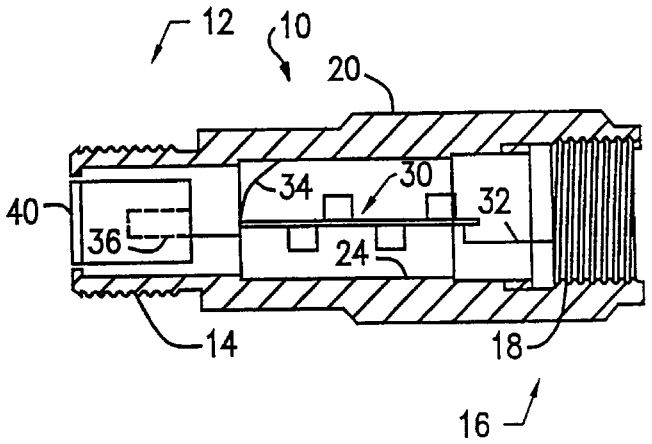
6,165,019 Dec. 26, 2000

Coaxial Cable Filter Assembly

Inventors: Thong B. Kha and Gary Knaus.
Assignee: Thomas & Betts International, Inc.
Filed: Nov. 24, 1999.

***Abstract*—**An in-line and ninety degree filter assembly is provided in the present invention for coupling a coaxial cable thereto. The coaxial cable has a coaxial wire disposed therein. The filter assembly includes a filter body that has a first end and a second end spaced apart from the first end. A circuit board is secured within the filter body for filtering electrical signals received from the coaxial cable. The circuit board includes a center coax in electrical and mechanical communication with the circuit board and a ground lead connected to the circuit board and protruding therefrom for electrically and mechanically communicating with the filter body upon installation of the circuit board into the filter body such that the circuit board is electrically grounded to the filter body.

20 Claims, 4 Drawing Sheets



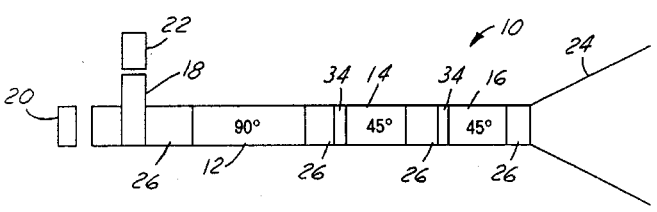
6,166,610 Dec. 26, 2000

Integrated Reconfigurable Polarizer

Inventors: Parthasarathy Ramanujam and Alan R. Keith.
Assignee: Hughes Electronics Corporation.
Filed: Feb. 22, 1999.

***Abstract*—**A tunable polarizer having a 90 degree phase shift section and two adjustable, or rotatable, 45 degree phase shift sections. Each section is separated by spacer to maintain independence and avoid interaction. When the two 45 degree phase shift sections and are orthogonal to each other, the polarization detected is determined by the 90 degree phase shift section which provides compatibility with circularly polarized signal. When the two 45 degree phase shift sections and are aligned, the polarizer is in a linear polarization compatibility mode.

20 Claims, 2 Drawing Sheets



6,166,612 Dec. 26, 2000

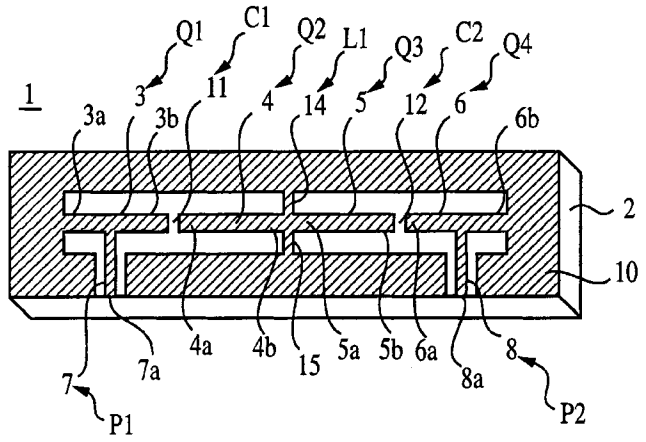
22 Claims, 5 Drawing Sheets

Coplanar Line Filter and Duplexer

Inventor: Tatsuya Tsujiguchi.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Feb. 1, 1999.

***Abstract*—**The present invention provides a coplanar line filter or a duplexer, comprising: a dielectric substrate; a plurality of λ/4 coplanar resonators provided on said dielectric substrate, said plurality of λ/4 coplanar resonators comprising; a first center conductor having electrical length corresponding to a quarter wavelength; and a ground conductor provided with a gap from said first center conductor; a capacitive coupling portion comprising ai gap provided between said first center conductors of a pair of said λ/4 coplanar resonators; and an inductive coupling portion, comprising a guide conductor which electrically connects said first center conductor and ground, provided at a joint portion of a pair of said λ/4 coplanar resonators; said plurality of λ/4 coplanar resonators being connected in series with said capacitive coupling portion and said inductive coupling portion provided alternately. By the above structure and arrangement, a small-scale coplanar line filter or duplexer of simple design is obtained.

6 Claims, 6 Drawing Sheets

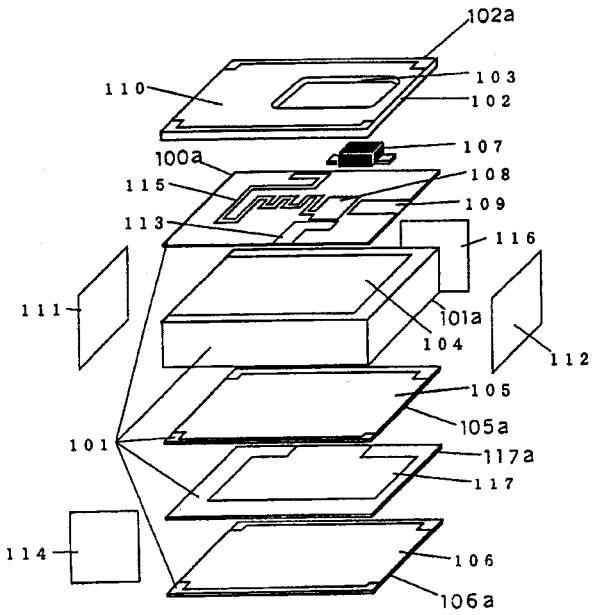


6,166,613 Dec. 26, 2000

Voltage-Controlled Resonator, Method of Fabricating the Same, Method of Tuning the Same, and Mobile Communication Apparatus

Inventors: Yoshihiro Nakagawa, Koichi Ogawa, Toshio Ishizaki, Makoto Sakakura, and Toshiaki Nakamura.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Jul. 18, 1997.

***Abstract*—**A voltage-controlled resonator is fabricated by laminating, one on top of the other, a first dielectric which has a resonant circuit and on the upper surface of which a variable-capacitance element is mounted, and a second dielectric which has a through-hole formed in a position thereof corresponding to the position of the variable-capacitance element and which has a dual function of shielding and resonant frequency tuning. With this structure, the height of the resonator can be further reduced compared with the prior art while retaining the shielding effect, and moreover, further precise resonant frequency tuning can be accomplished as compared with the prior art.



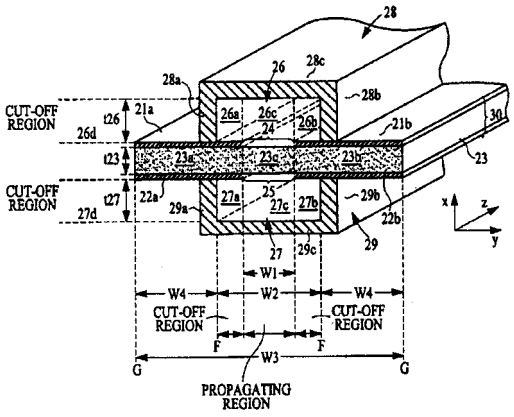
6,166,614 Dec. 26, 2000

Nonradiative Planar Dielectric Line and Integrated Circuit

Inventors: Yohei Ishikawa, Koichi Sakamoto, Atsushi Saitoh, and Kenichi Iio.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Jun. 5, 1998.

***Abstract*—**A nonradiative planar dielectric line exhibits low transmission losses and is easily connectable to electronic components. A first slot is provided between two electrodes on a first main surface of a dielectric plate. A second slot is provided between two electrodes on a second main surface of the dielectric plate. A first conductor is electrically connected to the electrodes on the first main surface and also covers the first slot. A second conductor is electrically connected to the electrodes on the second main surface and also covers the second slot. An integrated circuit using the above type of dielectric line is also provided. Thus, apparatuses using the above dielectric lines or integrated circuits are miniaturized.

10 Claims, 12 Drawing Sheets



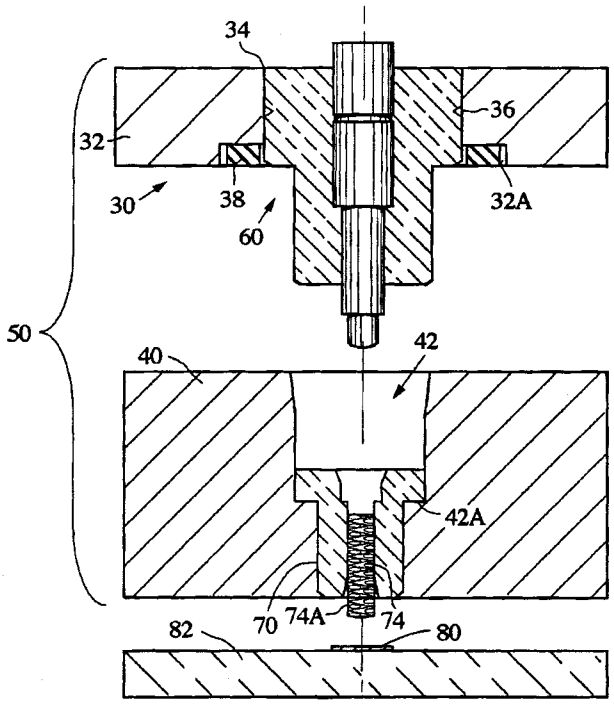
6,166,615 Dec. 26, 2000

Blind Mate Non-Crimp Pin RF Connector

Inventors: David T. Winslow, Clifton Quan, Hernan E. Romero, Claudio S. Howard, and Edward L. Robertson.
Assignee: Raytheon Company
Filed: Sep. 16, 1998.

***Abstract*—**An RF connector includes male and female connector components. The male component has a multi-diameter dielectric housing cylinder with a metal center conductor extending through an opening in the housing. The center pin extends from each end of the dielectric housing. The center pin and the dielectric housing are sized appropriately to provide a matched impedance at microwave frequencies for the use environment to which the male component is connected. The female connector component includes a dielectric body having a center cavity formed therein. A compressible wire bundle forming a compressible conductor member is recessed into the cavity. The compressible conductor protrudes from the far end of the female cavity allowing contact to a mating circuitry. The male connector component is assembled with the female component, the male center pin being brought into electrical contact with the compressible conductor member. The female connector component is not mechanically mounted to the next level of interconnect, but instead the protruding compressible conductor is brought into compressive electrical contact with a mating circuitry on the next interconnect level.

8 Claims, 3 Drawing Sheets



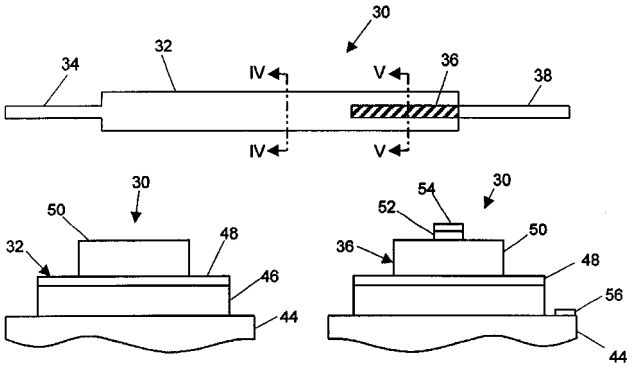
6,167,172 Dec. 26, 2000

Tapered Amplitude Optical Absorber for Waveguide Photodetectors and Electro-Absorption Modulators

Inventors: Elizabeth T. Kunkee and Timothy A. Vang.
Assignee: TRW Inc.
Filed: Mar. 5, 1999.

***Abstract*—**An optical waveguide device (**30**) that limits the peak optical intensity applied to an optical absorbing device (**36**), such as a photodetector or electro-absorption modulator. The optical waveguide device (**30**) includes a single mode input waveguide (**34**) coupled to a multi-mode, waveguide interference coupler (**32**). A single mode output waveguide (**38**) collects the light from the interference coupler (**32**). The absorbing device (**36**) is defined in the waveguide coupler (**32**) by a reverse-biased p-i-n diode structure. A voltage potential applied to the diode structure creates an electric field across the waveguide coupler (**32**) that causes the waveguide coupler (**32**) to absorb. Light entering the interference coupler (**32**) from the single mode waveguide (**34**) expands into other propagation modes that interact to constructively and destructively interfere. Because the light expands in the coupler (**32**), the amplitude of the light decreases even though the overall power remains substantially the same. When the light recombines as it approaches the output waveguide (**38**), the amplitude of the light returns to the input amplitude. The absorbing device (**36**) is defined in the waveguide coupler (**32**) between the area of interference (**24**) and the output waveguide (**38**). The absorption in the absorbing device (**36**) is exponential; the most light is absorbed at first and then progressively less light along the device.

21 Claims, 2 Drawing Sheets



6,167,176 Dec. 26, 2000

Fiber Optic Coupler

Inventor: Richard W. Belt.
Filed: Mar. 30, 1998.

***Abstract*—**A hermetically sealed fiber optic coupler for packaging end joined optical fibers. The device includes at least one first optical fiber having a glass-based portion having a first free end and a second optical fiber having a glass-based portion having a second free end joined to the first free end of the glass-based portion of the first optical fiber to form an end joint. The device further includes an outer chamber having at least one open end, the outer chamber surrounding the end joint, the outer chamber and the end joint being hermetically sealed with a thermosetting plastic. In the preferred embodiment, the device also includes a primary tubular sleeve, positioned between the end joint the outer chamber; epoxy for tacking the glass-based portions of the first and second optical fibers to the primary tubular sleeve; and thixotropic epoxy for hermetically sealing the ends of the primary tubular sleeve.

13 Claims, 3 Drawing Sheets