Patent Abstracts

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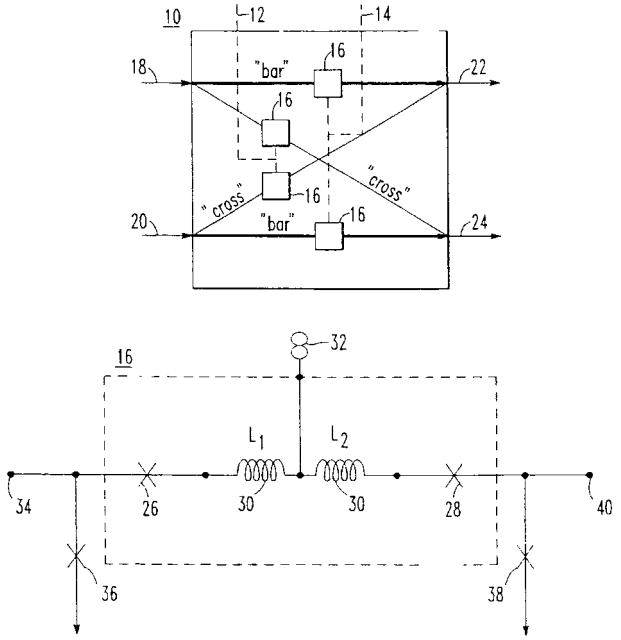
5,552,735 Sept. 3, 1996

Multigigahertz Single Flux Quantum Switch

Inventors: Joonhee Kang, John X. Przybysz, and Anthony H. Worsham.
Assignee: Northrop Grumman Corporation.
Filed: Oct. 7, 1994.

***Abstract*—**A switch for controlling the throughput of a signal between a pair of input channels and a pair of output channels is provided which receives an input signal from each of the pair of input channels. The switch transmits an output signal to each of the pair of output channels. Four line channels are provided within the switch. Each of the four line channels connects one of the pair of input channels and one of the pair of output channels. Four line channel switches are also provided, one line channel switch provided on each of the line channels. Each of the four line channel switches is controlled by a signal to open or close the four line channels.

8 Claims, 5 Drawing sheets



Publisher Item Identifier S 1051-8207(97)07753-2.

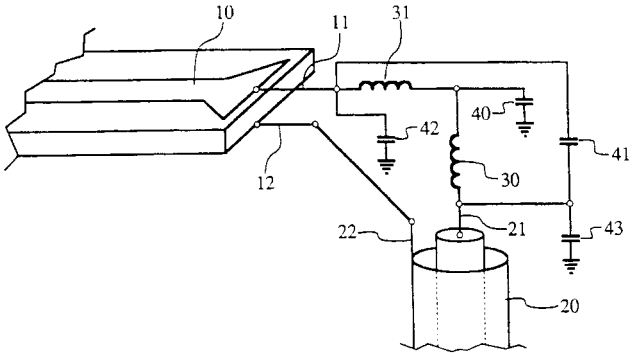
5,552,753 Sept. 3, 1996

Coax-to-Microstrip Transition

Inventors: Krishna K. Agarwal and Richard R. Harlan.
Assignee: E-Systems, Inc.
Filed: Dec. 28, 1994.

***Abstract*—**A coaxial-to-microstrip transition compensated to reduce the impedance discontinuity and parasitic inductance of the transition. The impedance discontinuity is reduced by decreasing the inductance due to the center conductor pin of the coaxial line and the inductance due to the bond wire connecting the center conductor pin to the microstrip line. The impedance discontinuity is also reduced by increasing the capacitance from the microstrip line to ground and from the microstrip line to the center conductor pin of the coaxial line. To reduce the inductance in the signal conduction path, a small-diameter center conductor pin is used. A short length of bond wire, doubled around the center conductor, is used to connect the center conductor pin to the microstrip line. Also, a thin dielectric substrate is used to minimize the length of the center conductor pin that extends beyond the base of the coaxial housing. The capacitance is increased by flaring the end of the microstrip line near the connection with the center conductor pin and partially extending the dielectric substrate over the opening in the coaxial line housing around the center conductor pin.

3 Claims, 1 Drawing Sheet



5,553,177 Sept. 3, 1996

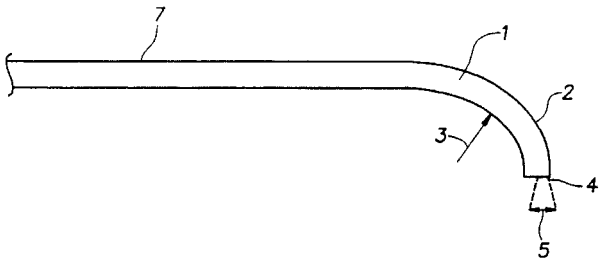
Optical Fiber Device which Increases Light Intensity

Inventors: Peter Hering and Michael Haisch.
Assignee: CeramOptec Industries, Inc.
Filed: July 14, 1994.

***Abstract*—**A lightguiding device, which can be an integral part of a lightguiding system, can increase the light intensity exiting from a lightguide by concentrating the transmitted light into a small portion of the lightguide's cross section. The device consists of a section of a lightguiding material which has been bent at an angle greater than 45 degrees relative to the axis of light transmission, preferably at an angle of 90 degrees with a small bend radius. In the bent section, a homogeneous refractive index is

required at least for the lightguide's core. The lightguide must be terminated immediately beyond the bent section. Alternatively, a preformed bent section of appropriate lightguiding material can be attached to an end of a straight section of lightguide to increase the exiting light intensity. All types of lightguiding systems can be used to enhance output intensities, including glass of pure silica lightguides, hollow waveguides, liquid core lightguides, and plastic lightguides. It is possible to provide exiting light of increased intensity across the full electromagnetic spectrum from UV to IR through selection of appropriate lightguiding materials.

19 Claims, 1 Drawing Sheet



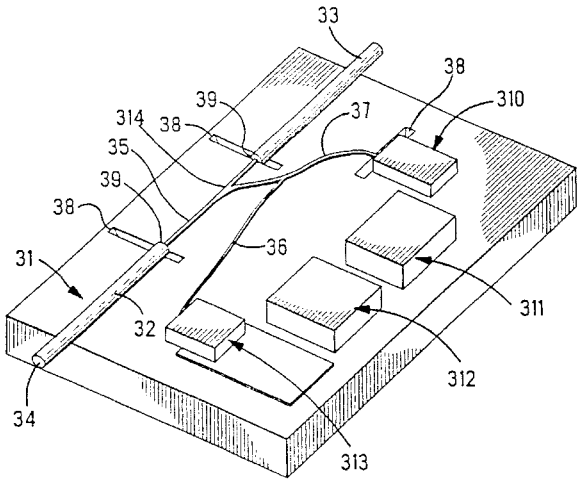
5,555,127 Sept. 10, 1996

Planar Hybrid Optical Amplifier

Inventors: Hatem Abdelkader, Robert A. Boudreau, Terry P. Bowen, Hongtao Han, Narinder Kapany, and Paul R. Reitz.
Assignee: The Whitaker Corporation.
Filed: Dec. 18, 1995.

***Abstract*—**A planar hybrid optical amplifier is fabricated on a single crystal substrate. The components that are common to a variety of optical amplifier circuits are mounted on the substrate and the planar device that results is readily interchanged in various applications. In one embodiment the multiplexed signal consisting of light from a pump laser and an optical signal are introduced into a rare earth-doped fiber which amplifies the input signal through stimulated emission of radiation.

7 Claims, 1 Drawing Sheet



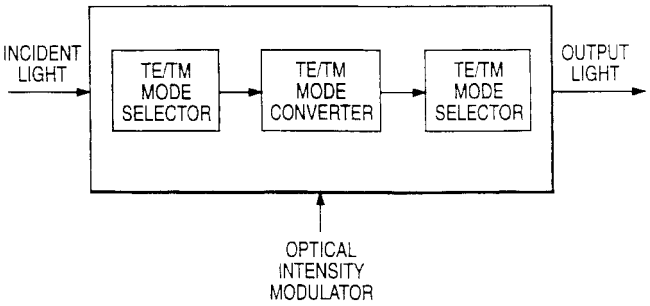
5,555,326 Sept. 10, 1996

Optical Waveguide Intensity Modulator Using Electrooptic Polymer

Inventors: Wol-Yon Hwang, Jang-Joo Kim, Tae-Hyoung Zyung, and Min-Chul Oh.
Assignee: Electronics & Telecommunications Research Inst.
Filed: Dec. 19, 1994.

***Abstract*—**An optical waveguide intensity modulator of a polymer waveguide utilizes and electrooptic effect and optical birefringence induced from a poling process of a nonlinear polymer thin-film. The optical waveguide intensity modulator is constructed by a series combination of a TE/TM mode selector, a TE or TM mode converter, and another TE or TM mode selector. In the polymer waveguide, the mode selectors and mode converter can be easily obtained by making the direction of a poling field to be horizontal (or vertical) and approximately 45° direction. According to the present invention, the optical waveguide intensity modulator is formed by integrating the TE or TM mode selectors and the TE or TM mode converter onto a single substrate. Further, because no element is required which results in optical losses, for example, an optical isolator, an optical coupler or a curved portion of the waveguide, the efficiency of the device can be improved.

12 Claims, 3 Drawing Sheets



5,557,246 Sept. 17, 1996

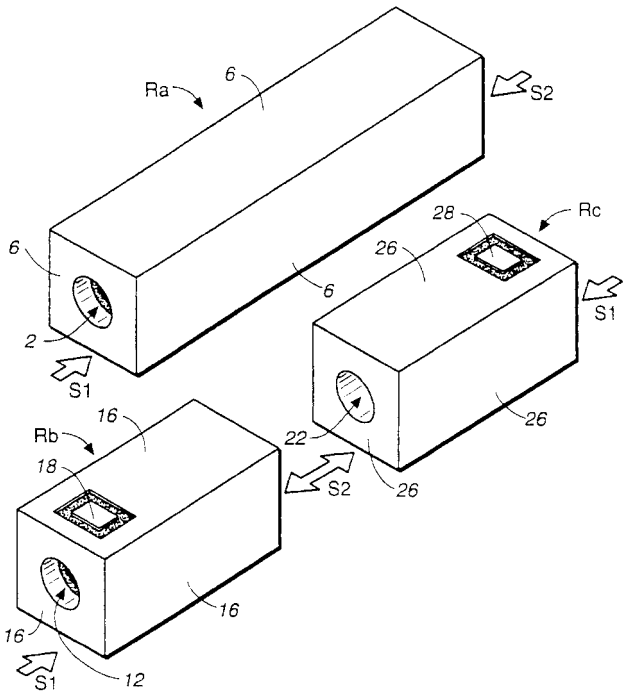
Half-Wavelength and Quarter-Wavelength Dielectric Resonators Coupled Through Side Surfaces

Inventors: Jinsei Ishihara and Shuuichi Sakai.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Feb. 17, 1995.

***Abstract*—**A compact multistage dielectric resonator apparatus is formed by attaching together many dielectric resonators having different resonant frequencies. Each of these dielectric resonators has a dielectric block with a throughole containing an axially extending inner conductor. The length of the inner conductor for each resonator is either about one-quarter or one-half wavelength of the corresponding resonant frequency. Outer surfaces of the resonators are substantially entirely covered by outer conductors but openings and/or coupling-providing conductors insulated from and entirely surrounded by the outer conductor are provided for magnetically and/or electrostatically

coupling the resonators which are attached together. Signal input–output terminals may also be provided separated from and surrounded by the outer conductors for easy mounting of the apparatus on a circuit board.

30 Claims, 14 Drawing Sheets



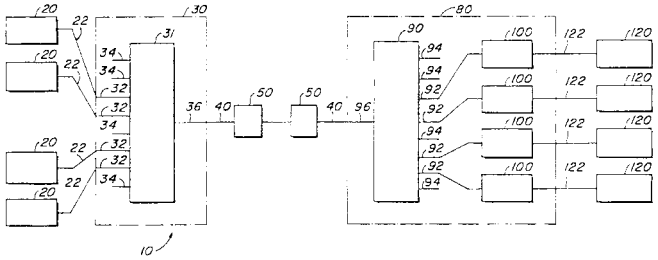
5,557,439 Sept. 17, 1996

Expandable Wavelength-Division-Multiplexed Optical Communications Systems

Inventors: Stephen B. Alexander, Steve W. Chaddick, and Victor Mizrahi.
Assignee: Ciena Corporation.
Filed: July 25, 1995.

***Abstract*—**The present invention provides wavelength-division-multiplexed optical communication systems configured for expansion with additional optical signal channels. In one embodiment, the WDM system comprises N source lasers for producing N optical signal channels, each channel having a unique wavelength where N is a whole number greater than or equal to two. An optical multiplexer module having $\mathrm{N}+\mathrm{x}$ inputs, where x is a whole number greater than or equal to one, optically communicates with each of the N source lasers. The $\mathrm{N}+\mathrm{x}$ input ports of the multiplexer are configured such that the N input ports are optically coupled to the N source lasers and the x input ports are supplemental ports not optically coupled to the N source lasers. An optical transmission path optically communicates with the multiplexer for carrying a multiplexed optical signal comprising the N optical signal channels. N optical channel selecting modules are provided, each selecting module including a Bragg grating configured to select a unique optical channel wavelength. An optical splitter module optically communicates with the optical transmission path and the optical channel selecting modules. The optical splitter includes $\mathrm{N}+\mathrm{y}$ output ports, where y is a whole number grater than or equal to one. The $\mathrm{N}+\mathrm{y}$ output ports are configured such that each of the N output ports is optically coupled to one of the N optical channel selecting modules and the y output ports are supplemental ports not optically coupled to the N optical channel selecting modules.

7 Claims, 1 Drawing Sheet



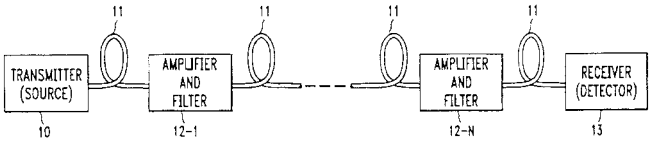
5,557,441 Sept. 17, 1996

Soliton Transmission System having Plural Sliding-Frequency Guiding Filter Groups

Inventor: Linn F. Mollenauer.
Assignee: AT&T.
Filed: Oct. 17, 1994.

***Abstract*—**Timing jitter problems are effectively eliminated in a soliton transmission system realized by deploying a series of optical filters in groups whose group average center frequency intentionally differs from the group average center frequency of other optical filter groups. The center frequency of the series of optical filter groups is translated along the desired length of the system in a predetermined manner such as frequency increasing, frequency decreasing, and combinations of both. This creates a transmission environment which is substantially opaque to noise while remaining perfectly transparent to solitons. By arranging the optical filters in groups, it is possible to simplify the system design by reducing the number of filters having different nominal center frequencies.

7 Claims, 7 Drawing Sheets



5,557,442 Sept. 17, 1996

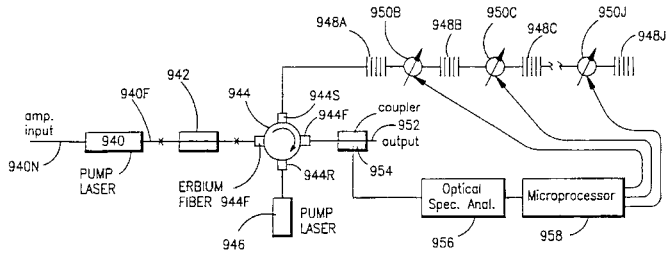
Optical Amplifiers with Flattened Gain Curves

Inventor: David R. Huber.
Assignee: Ciena Corporation.
Filed: Dec. 30, 1994.

***Abstract*—**The present invention relates to optical systems having optical amplifiers with flattened gain curves. In one embodiment, the invention

comprises an optical amplifier system having an optical input fiber and an optical amplifier device connected to receive optical input signals from the optical input fiber. A directional optical transfer device has a first port connected to receive an initial amplified output from said optical amplifier device. An optical attenuation fiber is connected to a second port of said optical transfer device, and receives the initial amplified output applied to the first port. The optical attenuation fiber supplies an adjusted amplified output to the second port and includes plural in-fiber gratings and plural attenuators. The in-fiber gratings and attenuators are configured such that an attenuator is disposed between two in-fiber gratings. Each in-fiber gratings reflects a different wavelength of optical energy. An optical output fiber connected to a third port of the directional optical transfer device receives the adjusted amplified output.

19 Claims, 18 Drawing Sheets



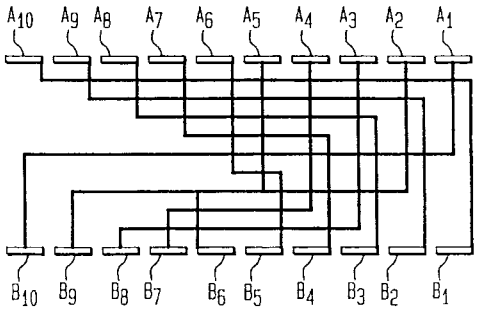
5,559,360 Sept. 24, 1996

Inductor for High-Frequency Circuits

Inventors: Tzu-Yin Chiu, Frank M. Erceg, Duk Y. Jeon, and Janmye Sung.
Assignee: Lucent Technologies Inc.
Filed: Dec. 19, 1994.

***Abstract*—**An inductor fabricated for semiconductor use is disclosed. The inductor is formed with a multilevel, multi-element conductor metallization structure which effectively increased conductance throughout the inductor thereby increasing the inductor's Q. The structure of the inductor may also provide for routing the current flowing through the multilevel, multi-element conductors in a way that increases the self-inductance between certain conductive elements, thereby increasing the inductor's total inductance.

14 Claims, 6 Drawing Sheets



5,559,913 Sept. 24, 1996

Broadband Integrated Optical Proximity Coupler

Inventor: Christian Lerminiaux.
Assignee: Corning Incorporated.
Filed: Jan. 30, 1995.

***Abstract*—**An integrated optical proximity coupler comprises first and second parallel straight interaction waveguide segments. First and second end segments are connected to the input ends of the first and second straight waveguide segments, respectively, by means including first and second curved segments, respectively. The end segments are both the same predetermined size which is determined by conventional optical fibers to which they are to be connected. To make the device broad banded, one of the straight segments must be narrower than the other. To reduce device excess loss, the first straight segment and at least part of its respective curved segment are made slightly narrower than the end segments, and the second straight segment and at least part of its respective curved segment are made slightly wider than the end segments. Thus, the required $\Delta\beta$ can be obtained without making the narrow path too narrow.

20 Claims, 2 Drawing Sheets