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.

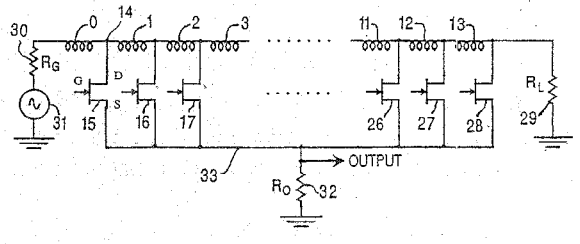
5,481,182 Jan. 2, 1996

Up/Down Spectrum Scaling of Signals

Inventors: Gopalkrishna G. Nadkarni and Lingappa K. Mestha.
Filed: Dec. 30, 1993.

Abstract—A system for scaling down the spectrum of a composite signal by a factor in real time to a lower frequency, or for scaling up the spectrum of a composite signal by a factor in real time to a higher frequency, is described. The spectrum up-conversion and down-conversion are achieved using Doppler effect analysis, switches, or sample and hold and analog-to-digital converters or equivalent sampling devices. As a source signal propagates over a transmission line having multiple delays, samples of the source signal are obtained at each delay and the samples are utilized to reconstruct the original source signal without losing any characteristics. The technique is well adapted for capturing single-event signals.

3 Claims, 11 Drawing Sheets



5,481,223 Jan. 2, 1996

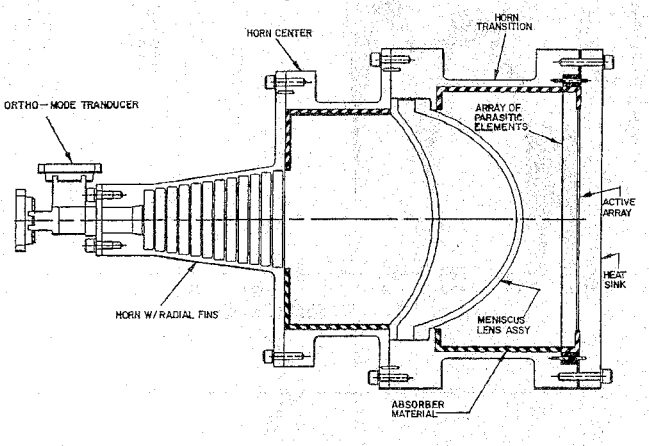
Bi-Directional Spatial Power Combiner Grid Amplifier

Inventor: Sam H. Wong.
Assignee: Rockwell International Corporation.
Filed: Sept. 13, 1994.

Abstract—A bi-directional spatial power combiner grid amplifier has an array of parasitic elements between the lens and the amplifier. The elements have different impedances to radiation of a first polarization (incident radiation) and of a second polarization, which is orthogonal to the first (amplified radiation), thereby providing impedance matching to both the input and the output of the grid amplifier. The elements preferably are separated slots or dipoles (some in each direction of polarization), crossed slots or dipoles, or micropatches.

18 Claims, 9 Drawing Sheets

Publisher Item Identifier S 1051-8207(97)00510-2.



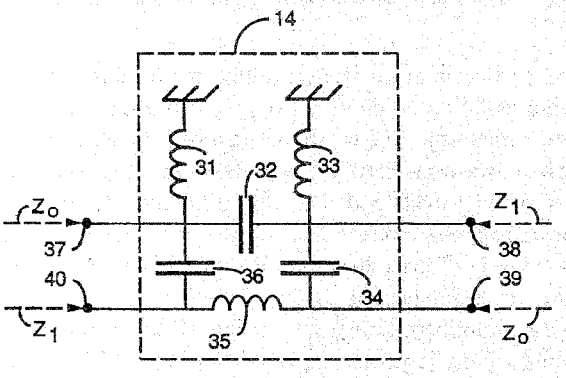
5,481,231 Jan. 2, 1996

Lumped-Element Four-Port Coupler

Inventors: Michael Dydyk and Craig E. Lindberg.
Assignee: Motorola, Inc.
Filed: June 21, 1994.

Abstract—A four-port coupler includes a first port adapted to impedance match to a first impedance Z_o, a second port adapted to impedance match to a second impedance Z_1 different than the first impedance, a third port adapted to impedance match to the first impedance, and a fourth port adapted to impedance match to the second impedance.

10 Claims, 3 Drawing Sheets



5,481,232 Jan. 2, 1996

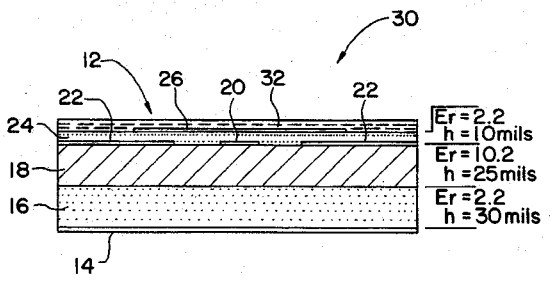
Optically Controlled Multilayer Coplanar Waveguide Phase Shifter

Inventors: Shih-Chang Wu and Haim Grebel.
Assignee: New Jersey Institute of Technology.
Filed: Apr. 19, 1995.

Abstract—A multilayer coplanar waveguide having a fine-patterned conductive top cover coated with a photosensitive material for optically controlling the phase shift within the waveguide. The multilayer coplanar waveguide comprises a conductive ground plane, a first dielectric layer formed on the conductive ground plane, a second dielectric layer formed on the first

dielectric layer, a conductive signal carrier, a pair of conductive floating ground planes flanking the conductive signal carrier formed on the second dielectric layer, a third dielectric layer formed on the conductive signal carrier, the pair of conductive floating ground planes, and the second dielectric layer, fine-patterned conductive strips formed on the third dielectric layer, and a photosensitive material layer formed on the fine-patterned conductive strips and the third dielectric layer. The photosensitive material, when illuminated, generates free electrons that drift toward the conductive strips, thereby increasing the resistance between the conductive strips and increasing the phase delay of signals propagating through the waveguide. Thus, the phase shift within the multilayer coplanar waveguide is optically controllable.

33 Claims, 5 Drawing Sheets



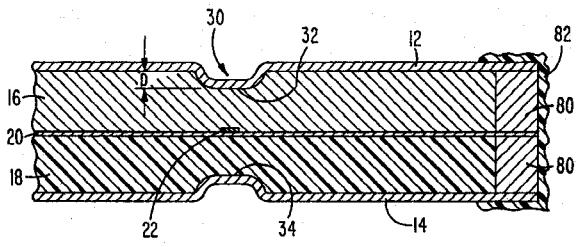
5,481,234 Jan. 2, 1996

Phase Trimmed Strip Transmission Lines and Method for Trimming

Inventors: Norman R. Landry and Edward J. Kent.
Assignee: Martin Marietta Corp.
Filed: Dec. 19, 1983.

Abstract—The electrical length of a strip transmission line structure is adjusted by adding conductive projections from the ground planar conductors, which extend in depth toward the strip conductor and in length along the strip conductor. These projections may preferably be formed by inward deformation of the ground planes at the desired locations. In strip transmission lines having the strip conductor positioned between two ground planes, projections are preferably added in aligned pairs with each ground plane providing one of the projections of the pair.

16 Claims, 3 Drawing Sheets



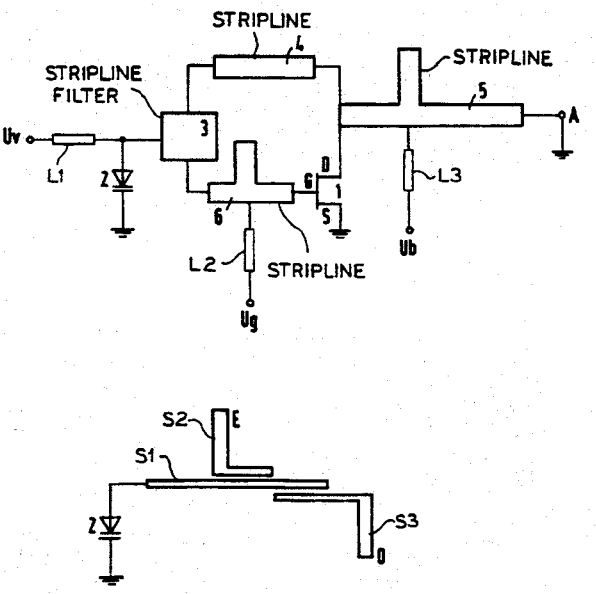
5,483,206 Jan. 9, 1996

Voltage-Controlled Microwave Oscillator with Micro-Stripline Filter

Inventor: Gerhard Lohninger.
Assignee: Siemens Aktiengesellschaft.
Filed: Nov. 24, 1993.

Abstract—A voltage-controlled microwave oscillator having a field effect transistor (**1**) as an amplifier and having a varactor diode (**2**) as a frequency-determining element has high output power and a large enough frequency sweep in the microwave frequency range that S-parameter scatters of the active components have optimally little influence on the characteristic data of the oscillator. The varactor diode (**2**) is preceded by a tunable micro stripline filter (**3**), and the source electrode of the field effect transistor (**1**) is directly connected to ground in order to form a parallel feedback with the micro stripline filter (**3**).

11 Claims, 1 Drawing Sheet



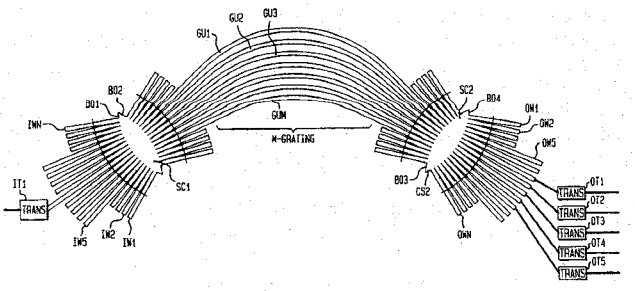
5,483,369 Jan. 9, 1996

Communication Systems Using Passive RF Routing

Inventors: Thomas E. Darcie, Ivan P. Kaminow, and Dietrich Marcuse.
Assignee: AT&T Corp.
Filed: Nov. 3, 1993.

Abstract—Communication between an upstream point, such as a TV-source headend followed by a fiber optic line, and a number of downstream points, such as coaxial cable connected subscriber locations, is achieved by wavelength or frequency demultiplexing a spectrum of downstream radio-frequency signals with a surface-acoustic-wave (SAW) demultiplexer–multiplexer and distributing the demultiplexed signals to the downstream points, for example through the cables.

26 Claims, 5 Drawing Sheets



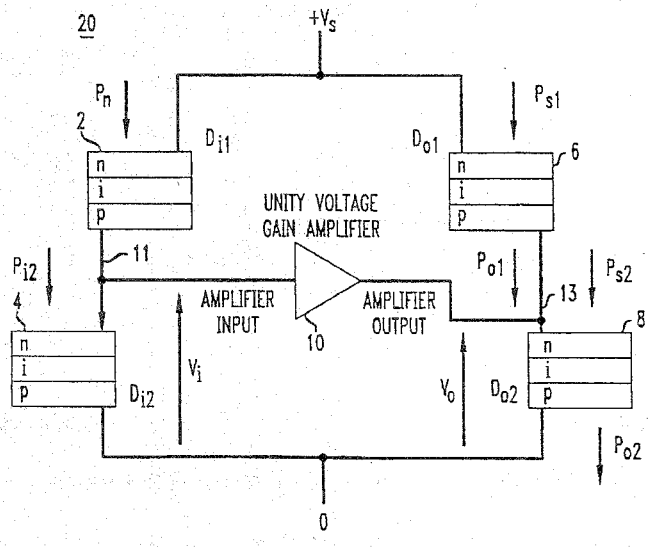
5,483,375 Jan. 9, 1996

Optical Ratio Amplifier

Inventor: David A. B. Miller.
Assignee: AT&T Corp.
Filed: Dec. 14, 1994.

Abstract—An apparatus for amplifying the optical power ratio includes first and second input electro-absorption modulators coupled together in series that each receive an optical input beam. First and second output electro-absorption modulators are coupled together in series and each generate an optical output beam. A voltage amplifier electrically couples a first node located between the first and second input modulators to a second node located between the first and second output modulators. In operation, the power ratio of the output beams is a function of the power ratio of the input beams.

7 Claims, 2 Drawing Sheets



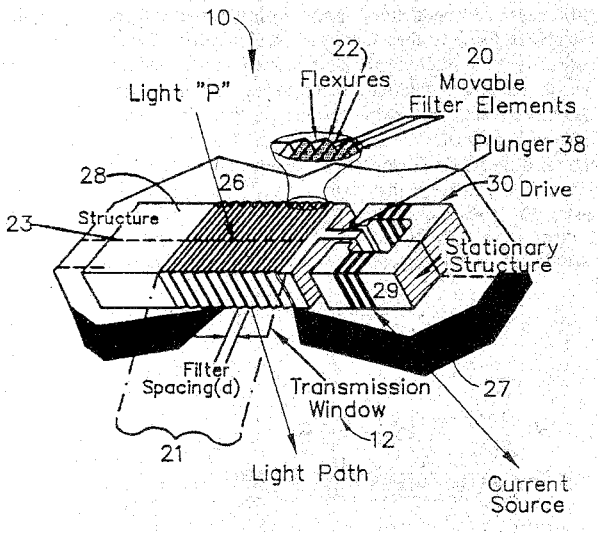
5,483,387 Jan. 9, 1996

High-Pass Optical Filter

Inventors: Paul E. Bauhahn, Thomas Ohnstein, and James D. Zook.
Assignee: Honeywell, Inc.
Filed: July 22, 1994.

Abstract—A microstructure device having a array of deep lamellar structures resembling parallel plates has sharp high-pass cutoff behavior associated with incident TE-polarized radiation. When two such microstructures are disposed in an orthogonal orientation, they act like a two-dimensional array of rectangular waveguides with the cutoff behavior determined by the separation of the respective parallel plates. Another embodiment of the present invention employs a linear drive to articulate the array of coupled parallel plates to tune the filter to the operative incident radiation relatively independent of the angle of incidence. The microstructure finds application placed proximate to the focal plane of an array of radiation-sensitive material so that very high resolution multispectral images may be generated. When the array is articulated by a linear actuator, a preselected cutoff frequency may be tuned so that multispectral imaging occurs independent of the imaging technology employed, with applications for remote sensing of chemical agents, satellite surveys of agricultural resources, meteorological conditions, or environmental quality. When disposed in a gas absorption cell, opposing an IR source and proximate an IR detector the tunable filter can be used for gas analysis.

20 Claims, 9 Drawing Sheets



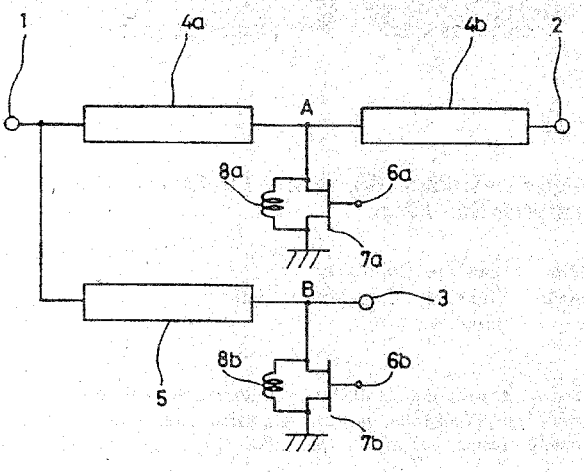
5,485,130 Jan. 16, 1996

Microwave Switch Circuit and an Antenna Apparatus

Inventors: Kazuhiko Nakahara and Takuo Kashiwa.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Jan. 24, 1995.

Abstract—A microwave switch circuit includes a first impedance conversion circuit, one end of which is connected to an input terminal; a resonance circuit connected between an output of the first impedance conversion circuit and ground and including a parallel connection of a field effect transistor and a resonance inductor; and a second impedance conversion circuit connected between the output of the first impedance conversion circuit and an output terminal. One microwave switch circuit may be connected between an antenna terminal and a signal input terminal and another microwave switch circuit may be connected between the antenna terminal and a signal receiving terminal. The microwave switch circuit output terminal and input terminal may have an impedance of 50 Ω and the output of the first impedance conversion circuit may have an impedance lower than 50 Ω. The microwave switch circuit may include one-fourth wave-length transmission lines as the first and second impedance conversion circuits. Consequently, the maximum allowable value of the incident power is increased and withstand power is increased in an antenna switch circuit.

4 Claims, 10 Drawing Sheets



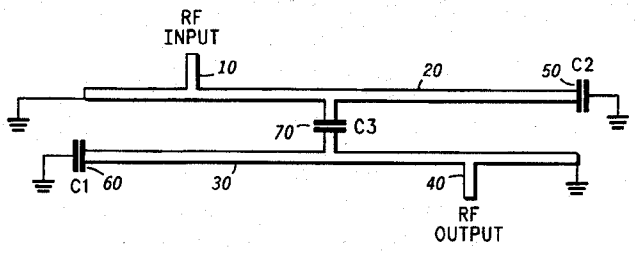
5,485,131 Jan. 16, 1996

Transmission Line Filter for MIC and MMIC Applications

Inventors: Lyle A. Fajen and Michael Dydyk.
Assignee: Motorola, Inc.
Filed: Oct. 13, 1994.

Abstract—A transmission line filter includes first and second substantially parallel transmission lines (**20**, **30**), with alternate ends grounded and each transmission line (**20**, **30**) coupled through a separate capacitor (**50**, **60**) to electrical ground. A coupling capacitor (**70**) connects the first and second transmission lines (**20**, **30**). A RF output (**40**) coupled to the second transmission line (**30**) outputs a filtered RF signal in response to a RF signal input to a RF input (**10**) on the first transmission line (**20**). MIC and MMIC applications using series capacitance to allow for line length to be reduced include versions of a band pass filter (FIGS. **5**, **6**), bandstop filter (FIG. **7**), and low-pass filter (FIG. **9**).

20 Claims, 4 Drawing Sheets



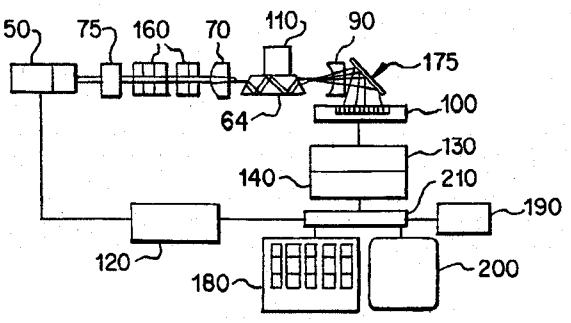
5,485,277 Jan. 16, 1996

Surface Plasmon Resonance Sensor and Methods for the Utilization Thereof

Inventor: Mark W. Foster.
Assignee: Physical Optics Corporation.
Filed: July 26, 1994.

Abstract—A surface plasmon resonance sensor including: a substrate-mode metal-film-coated waveguide cartridge including a planar waveguide, including a plurality of reflector surfaces within the planar waveguide; a metal film deposited directly on the planar waveguide, the metal film and the planar waveguide defining a plasmon resonance interface directly on the planar waveguide; a sample flow cell adjacent the substrate-mode metal-film-coated waveguide cartridge; a transverse magnetic polarized light source optically connected to the planar waveguide; a cylindrical diverging lens optically connected to the planar waveguide; and a detector array comprising a plurality of photodetectors optically connected to the cylindrical diverging lens. Methods of using the surface plasmon resonance sensor are also disclosed.

20 Claims, 10 Drawing Sheets



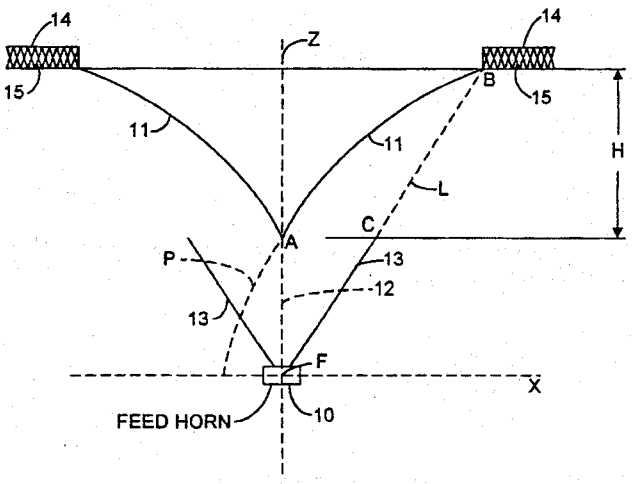
5,486,838 Jan. 23, 1996

Broadband Omnidirectional Microwave Antenna for Minimizing Radiation Toward the Upper Hemisphere

Inventor: Geza Dienes.
Assignee: Andrew Corporation.
Filed: Apr. 19, 1994.

Abstract—An omnidirectional microwave antenna comprises a conical reflector and a conical feed horn. The conical reflector has a reflecting surface defined by a cone having an axis and a surface of revolution around the axis. The line of intersection between the surface of revolution and a plane passing through the axis and the surface of revolution is a segment of a parabolic curve. The reflector includes a flange extending outward from an outermost circumference of the surface of revolution of the cone. The conical feed horn feeds microwave energy to the conical reflector from a location along the axis of the cone. The feed horn has an aperture whose center is located approximately at the apex of the cone. The flange has absorptive material mounted thereto for absorbing microwave energy impinging thereon.

17 Claims, 2 Drawing Sheets



5,486,839 Jan. 23, 1996

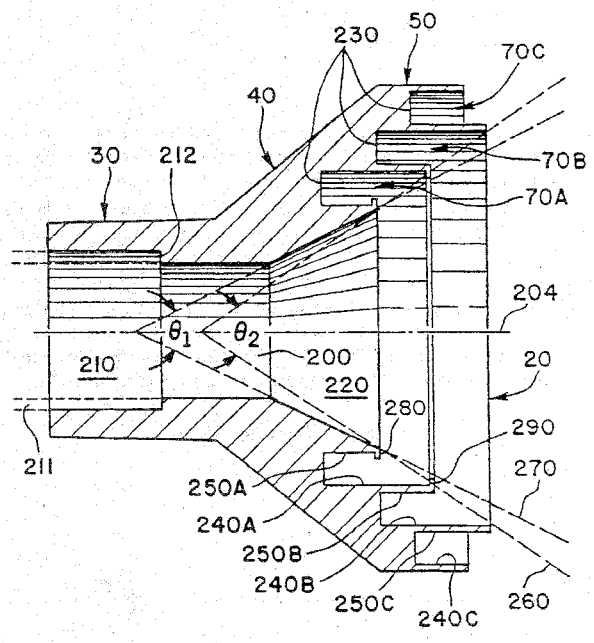
Conical Corrugated Microwave Feed Horn

Inventors: Charles E. Rodeffer, Edgar J. Denlinger, and Aly E. Fathy.
Assignee: Winegard Company.
Filed: July 29, 1994.

Abstract—A conical corrugated microwave feed horn. A conical flare section is formed at the aperture of the feed horn and a second smooth cylindrical section is formed at the throat of the feed horn. The conical flare section is formed with two regions. The first region is a corrugated conical region formed at the aperture and having a plurality of slots formed parallel to the central axis of the feed horn. Each slot in the plurality of slots has an inner surface closest to the central axis of the feed horn and an outer surface furthest from the central axis. Connecting the corrugated conical region to the cylindrical throat is a smooth conical region. The first slot adjacent the smooth conical region has first and second formed lips on the terminating end thereof. The lips are formed directed inwardly toward each other. The last slot of the

plurality of slots at the aperture of the feed horn has the terminating end of the inner surface extending in length beyond the length of the outer surface.

16 Claims, 5 Drawing Sheets



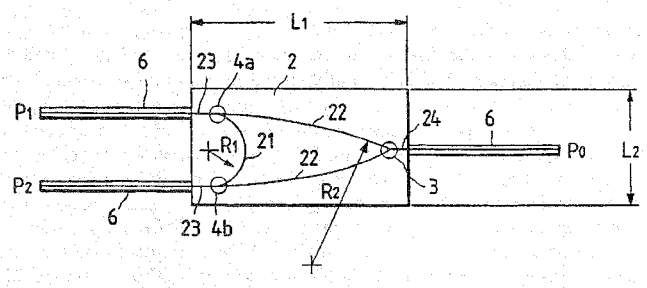
5,487,122 Jan. 23, 1996

Star Coupler Including Waveguides Having Different Radius of Curvatures

Inventor: Takeshi Ota.
Assignee: Fuji Xerox Co., Ltd.
Filed: Feb. 9, 1993.

***Abstract*—A first terminal is connected to a second terminal by means of a first waveguide having a first radius of curvature. The first terminal (or second terminal) is connected to a third terminal by means of a second waveguide (or a third waveguide) having a second radius of curvature that is greater than the first radius of curvature. Incident light supplied from the first terminal is branched between the first waveguide and the second waveguide, and the light entering the first waveguide undergoes the greater attenuation since this waveguide has the smaller radius of curvature. Hence, the light component passing through the first waveguide has a difference in output from the component passing through the second waveguide that is sufficiently great to provide a large branching ratio.**

12 Claims, 6 Drawing Sheets



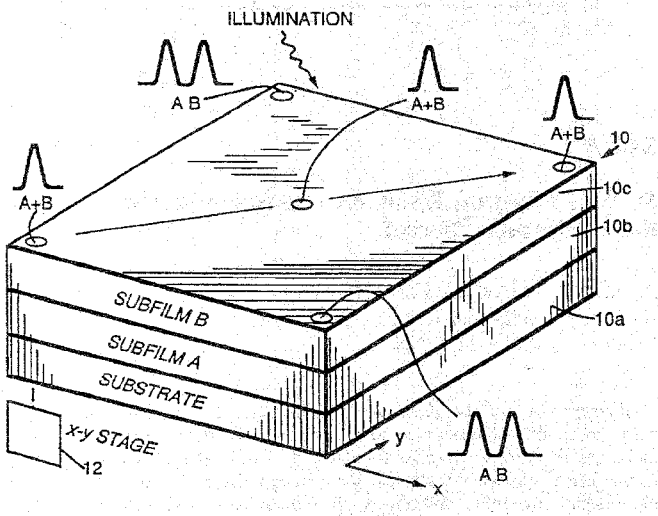
5,488,511 Jan. 30, 1996

Spatially Tunable Rugate Narrow Reflection Band Filter

Inventor: Thomas D. Rahmlow, Jr.
Assignee: Hughes Aircraft Company.
Filed: Apr. 3, 1992.

Abstract*—An optical filter (**10**) has a radiation receiving surface, the filter including a rugate reflection filter having a reflection wavelength characteristic varies along an axis of the radiation receiving surface. The optical filter includes a plurality of serially disposed rugate coatings (**10b*, **10***c*) and has a wavelength rejection gradient that exhibits a linear, logarithmic, or power function of wavelength rejection as a function of position on the radiation receiving surface. Two or more rugate subfilms may overlap one another, or none of the rugate subfilms may overlap. The filter has a first optical density associated with a first one of the subfilms, a second optical density associated with a second one of the subfilms, and, for overlapping spectral ranges, a third optical density within a region wherein at least two subfilms overlap one another. The third optical density is a summation of the first optical density and the second optical density.**

19 Claims, 4 Drawing Sheets



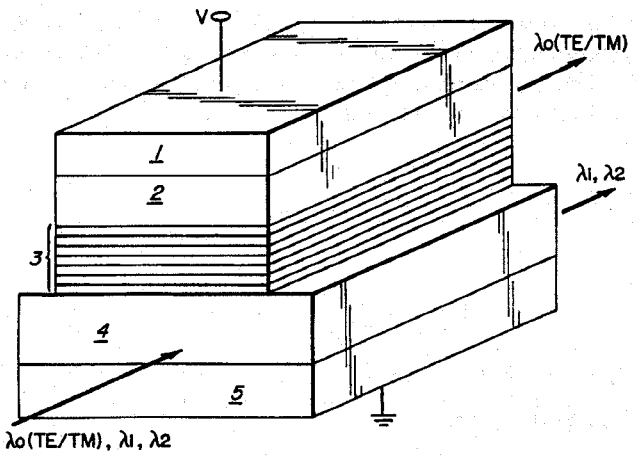
5,488,679 Jan. 30, 1996

Polarization-Independent Wavelength Tunable Filter Based on Birefringence Compensation

Inventor: Chi Wu.
Assignee: Northern Telecom Limited.
Filed: Oct. 27, 1994.

***Abstract*—A polarization-independent wavelength tunable filter in the form of a dual-waveguide direction coupler. The conditions necessary to achieve coupling of a selected wavelength including both TE and TM polarization modes from one waveguide to a second waveguide in close proximity are achieved through a combination of geometrical and compositional tailoring of the waveguides and birefringence compensation in the waveguide and coupling layer.**

23 Claims, 5 Drawing Sheets



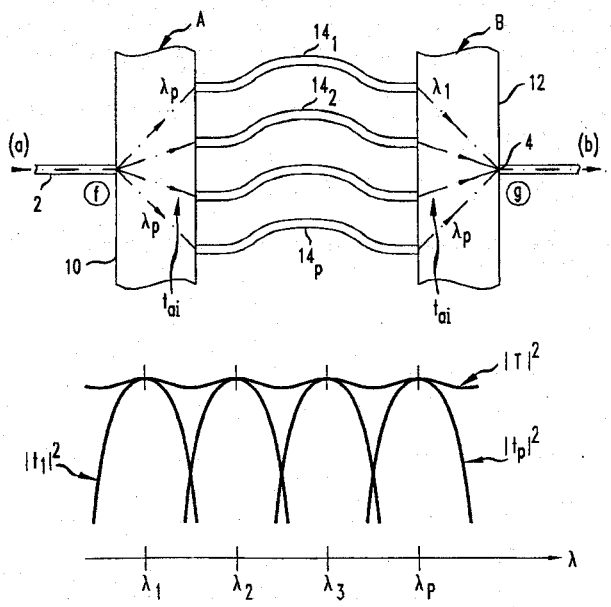
5,488,680 Jan. 30, 1996

Frequency Routing Device Having a Wide and Substantially Flat Passband

Inventor: Corrado Dragone.
Assignee: AT&T Corp.
Filed: Aug. 24, 1994.

Abstract—An optical apparatus is provided that includes a first frequency routing device having at least one input port and P output ports, where $P > 2$. A second frequency routing device is also provided that has P input ports and at least one output port. P optical paths couple the input port of the first frequency routing device to the output port of the second frequency routing device.

15 Claims, 6 Drawing Sheets



5,488,681 Jan. 30, 1996

Method for Controllable Optical Power Splitting

Inventors: David A. G. Deacon, Michael J. Brinkman, and William K. Bischel.
Assignee: Deacon Research.
Filed: Sept. 9, 1994.

Abstract—A method for operation of a new class of optical energy transfer devices and energy guiding devices uses an electric field to control energy propagation using a class of poled structures in solid material. The poled structures, which may form gratings in thin film or bulk configurations, may be combined with waveguide structures. Electric fields applied to the poled structures control routing of optical energy. Devices include splitters, parallel and Y couplers, mode converters, and energy leakage attenuators.

4 Claims, 30 Drawing Sheets