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, D.C. 20231.

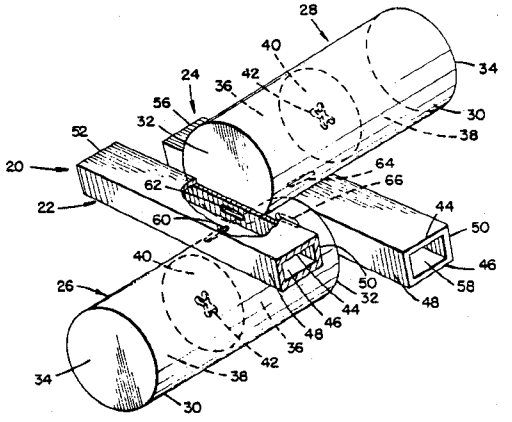
4,780,694 Oct. 25, 1988

Directional Filter System

Inventors: Rolf Kich, Paul J. Tatomir, and Martin. B. Hammond.
Assignee: Hughes Aircraft Company.
Filed: Nov. 23, 1987.

Abstract—A filter system is composed of two identical filters coupled between an input waveguide and an output waveguide to provide a 4-port directional filter characteristic operable with quasi-elliptic linear modes of electromagnetic propagation within each of the filters. Each of the filters may be constructed of a plurality of cavities arranged serially, one behind the other, with one of the cavities in each of the filters being employed for coupling electromagnetic power between the two waveguides. The coupling is accomplished by use of a transverse slot and a longitudinal slot in each of the waveguides, the slots extending through sidewalls of the waveguides into walls of the cavity in each of the filters for symmetric and antisymmetric coupling, respectively, of longitudinal and transverse components of a transverse electric wave in each of the waveguides. A phase quadrature relationship between components of a magnetic field coupled form the input waveguide is retained by the filters and, upon radiation via the slots into the output waveguide, results in the generation of an output wave in only one direction from the output waveguide, there being cancellation of a wave in the opposite direction from the output waveguide.

8 Claims, 3 Drawing Sheets



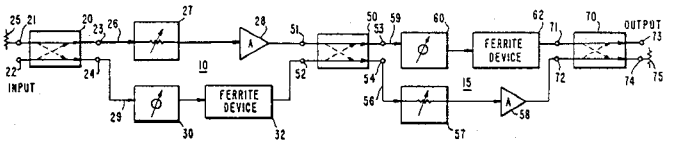
4,782,307 Nov. 1, 1988

Feed-Forward Microwave Amplifier Arrangement with Ferrite Temperature Compensation

Inventor: Rui T. Hsu.
Assignee: Hughes Aircraft Company.
Filed: June 8, 1987.

Abstract—A feed-forward microwave amplifier arrangement is disclosed having an error-detecting loop including a main amplifier branch and a phase-shift branch, as well as an error-canceling loop including an auxiliary amplifier branch and a phase-shift branch. A temperature compensating arrangement including a ferrite slab centrally mounted in a stepped rectangular waveguide is provided in the phase-shift branch of the error-canceling loop. The temperature compensating arrangement has a phase versus temperature characteristic similar to that of the auxiliary amplifier. An additional ferrite temperature compensating arrangement, having a phase versus temperature characteristic similar to that of the main amplifier, may be provided in the phase-shift branch of the error-detecting loop.

24 Claims, 1 Drawing Sheet



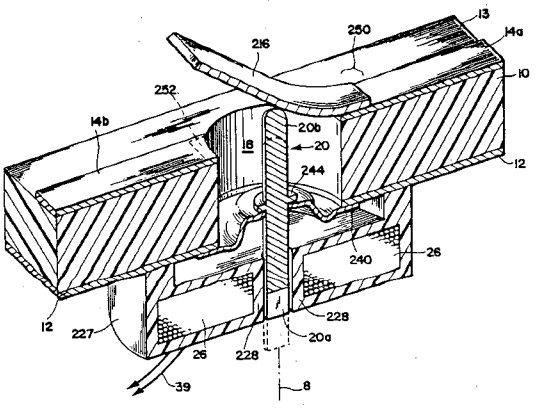
4,782,313 Nov. 1, 1988

Transmission Line Shorting Switch

Inventor: Donald S. Brant, Jr.
Assignee: General Electric Company.
Filed: Jan. 12, 1988.

Abstract—A switch arrangement for interrupting signal flow on a microstrip transmission line includes an electromagnetically actuated conductive plunger extending through a hole in the dielectric plate on which the microstrip is formed. The strip conductor end adjacent the hole, and a spring conductive bridging element extends across the hole, fixed to one strip conductor and free to make contact with the other. The plunger is supported by a conductive diaphragm spring connected to the ground plane of the microstrip, thereby eliminating sliding contacts. When actuated, the plunger simultaneously lifts the bridging element free from the one strip conductor and short-circuits the other.

6 Claims, 8 Drawing Sheets



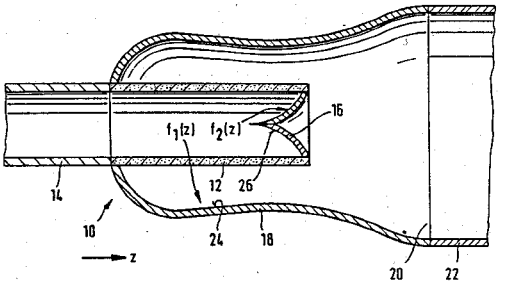
4,782,314 Nov. 1, 1988

Fluid-Tight Coupling Device for Microwaves

Inventors: Günther Müller and Rolf Wilhelm.
Assignee: Max-Planck Gesellschaft zur Foerderung der Wissenschaften e.V.
Filed: May 27, 1987.

Abstract—A fluid-tight coupling device for microwave radiation of high energy inlcudes a tubular dielectric window which is sealingly connected to one end of a waveguide supplying the microwave radiation and forms a continuation of the waveguide. The other end of the tube forming the window is tightly sealed by an essentially conical reflector. The tube forming the window is surrounded on the outside by a cup-shaped waveguide portion. The reflecting surface of the reflector and the reflecting inner surface of the cup-shaped waveguide portion are formed such that the microwave radiation emerging from the waveguide is reflected through the tubular window into the cup-shaped waveguide portion and from the latter to the open end of the waveguide portion in such a manner that an input mode of type TE_{mn} is transformed into itself or a well-defined adjacent mode $TE_{m'n'}$, further secondary modes are minimized and at the same time return waves are also minimized. Due to the cylidrical form a window area of one or two orders of magnitude larger than in the known plane windows is obtained and thus a correspondingly smaller area stress so that even very high microwave powers can be transmitted.

7 Claims, 2 Drawing Sheets



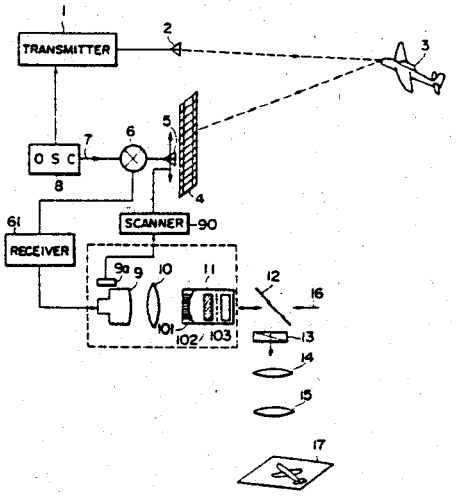
4,783,134 Nov. 8, 1988

Microwave Holograph Device

Inventors: Tsutomu Hara, Yoshiji Suzuki, and Ming H. Wu.
Assignee: Hamamatsu Photonics Kabushiki Kaisha.
Filed: July 21, 1986.

Abstract—In a microwave holographic device, the main lobe of a microwave antenna is spatially scanned to receive a microwave signal reflected from an object. The received microwave signal is mixed with a reference signal to generate two-dimensional electric information, synchronized with the scanning. The two-dimensional electric information is used to change the optical properties of an electrooptic material, and then the optical property changes are read out to obtain a holographic image.

9 Claims, 1 Drawing Sheet



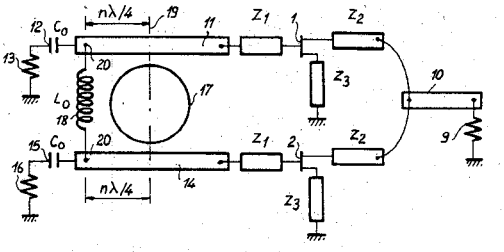
4,783,638 Nov. 8, 1988

Frequency-Doubling Oscillator Working at Ultra-high Frequencies

Inventors: Marguise Mamodaly, Pascal Colin, Alain Bert, and Juan Obregon.
Assignee: Thomson-CSF.
Filed: June 10, 1987.

Abstract—The invention pertains to a doubling oscillator with low noise in the vicinity of the carrier frequency. The doubling oscillator of the invention is of the "push-push" type comprising two parallel-mounted transistors. The gates of these two transistors have a common oscillating circuit comprising two microstrip lines, two resistors and a common dielectric resonator positioned between the two microstrip lines. To reduce the low-frequency noise in the vicinity of the carrier near the load, the non-correlated low frequency noise sources of the transistors are either placed in series by means of a choke and two capacitances mounted at the ends of the microstrips or loaded at an infinite impedance through two capacitances mounted at the ends of the microstrips. This oscillator has applications in ultra-high frequency systems, radars and telecommunications.

6 Claims, 2 Drawing Sheets



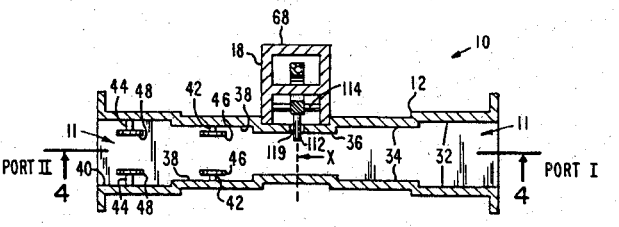
4,783,639 Nov. 8, 1988

Wide-Band Microwave Diplexer Including Band-Pass and Band-Stop Resonators

Inventors: Thomas Hudspeth and Fritz Steinberg.
Assignee: Hughes Aircraft Company.
Filed: Nov. 21, 1985.

Abstract—A wide-band microwave diplexer is provided which includes a waveguide section characterized by a longitudinal dimension, and defining first and second longitudinally spaced ports, for propagating microwave power substantially within a first lower frequency band between said first port and said second port; coupling resonator means for coupling microwave power substantially within a second higher frequency band between said waveguide section and a coaxial transmission line; and band-stop filter means for substantially preventing microwave power substantially within the second frequency band from propagating to said second port.

20 Claims, 4 Drawing Sheets



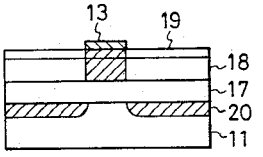
4,784,451 Nov. 15, 1988

Waveguide Optical Switches

Inventors: Hitoshi Nakamura, Tadashi Fukuzawa, Koji Ishida, Hiroyoshi Matumura, Kenji Hiruma, and Hiroaki Inoue.
Assignee: Hitachi, Ltd.
Filed: Aug. 5, 1985.

Abstract—The present invention provides a waveguide type optical switch which has a high extinction ratio and can be driven efficiently at a low voltage or a low current injection. Where the waveguide type optical switch is used as a reflection type optical switch, the switch section is of current confinement structure, and where it is used as a directional coupler type optical switch, the pn junction is formed in the position where the optical electric field takes the maximum value for the fundamental mode of the light propagating in the waveguide.

8 Claims, 8 Drawing Sheets



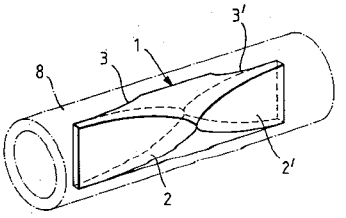
4,785,266 Nov. 15, 1988

Dielectric Rod Polarizer Having Wedge Shape Polarizing Portions

Inventors: Paul Newham and Bernard J. Andrews.
Assignee: The Marconi Company Limited.
Filed: July 6, 1987.

Abstract—A microwave polarizer is provided in the form of a wedge at the termination of a rod of dielectric material. Preferably the wedge tapers exponentially in order to provide a good impedance match. Circularly polarized radiation propagating along the rod experiences a differential phase shift at the wedge. This phase shift may be arranged to be 90°, so that linearly polarized radiation exits from the wedge. A continuous circular or square guide is used to contain the dielectric rod so that simultaneous orthogonal signals can be converted to or from circular polarizations. Such a wedge termination may be provided at the end of a splashplate or polyrod antenna feed, for a satellite communication system, where right-handed circular polarization is used on the up-link and left-handed circular polarization is used on the down link. The conventional orthomode transducer may be dispensed with, thereby enabling the sub-reflector to be located closer to the main reflector, thus reducing blockage and increasing the bandwidth.

7 Claims, 2 Drawing Sheets



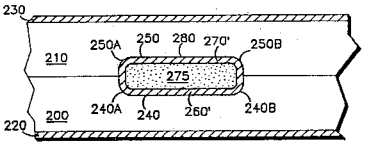
4,785,271 Nov. 15, 1988

Stripline Filter with Improved Resonator Structure

Inventor: Robert J. Higgins, Jr.
Assignee: Motorola, Inc.
Filed: Nov. 24, 1987.

Abstract—A stripline filter resonator structure is provided which exhibits high Q and results in a filter with low insertion loss. The dielectric consists of two sections of dielectric material. A groove shaped as half an ellipse is formed in each of the sections. The surface of the grooves are covered with electrically conductive material. The two grooves are aligned and filled with adhesive material to hold the two dielectric sections together. An elliptically shaped resonator is thus formed in the center of the dielectric sandwich. Ground plane layers are respectively situated on the outer layers of the dielectric sandwich thus forming a stripline resonator structure. This unique resonator structure results in a more uniform current density around the periphery and thus undesired current bunching is correspondingly decreased.

5 Claims, 5 Drawing Sheets



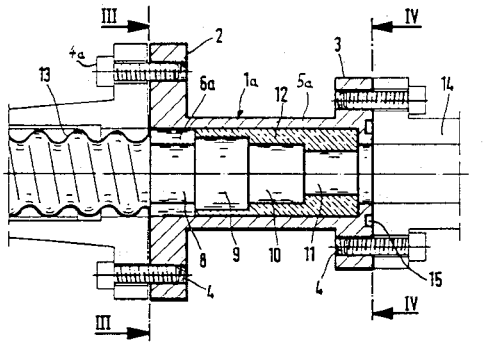
4,786,883 Nov. 22, 1988

Transformation Device for Connecting Waveguides

Inventor: Georg Spinner.
Filed: Sept. 11, 1987.

Abstract—A transformation device for connecting waveguides of different cross section includes a waveguide element which is provided with at least two successive transforming sections and has a rotationally symmetrical recess extending in axial direction over all transforming sections. Inserted in the recess along a respective portion thereof are a plurality of insulating rigs so that one of said transforming sections adjoining the connection plane with one of the waveguides is defined by said recess while subsequent transforming sections are defined by the insulating rings of corresponding varying inner diameter.

14 Claims, 5 Drawing Sheets



4,788,511 Nov. 29, 1988

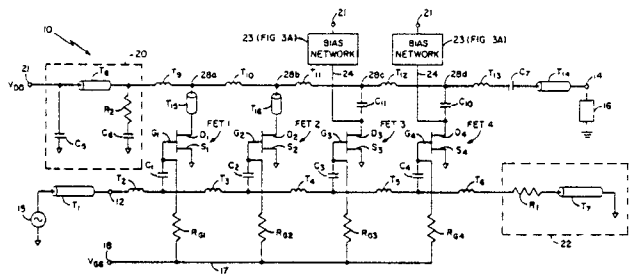
Distributed Power Amplifier

Inventor: Manfred J. Schindler.
Assignee: Raytheon Company.
Filed: Nov. 30, 1987.

Abstract—A distributed amplifier includes a plurality of field effect transistors, each having gate, drain, and source electrodes, successively coupled between an input terminal and an output terminal. The gate electrode of each one of successively coupled FET's is coupled to the input terminal through a corresponding one of a plurality of capacitors and selected ones of the drain electrodes of the FET's are coupled to the output terminal through one of a corresponding second plurality of capacitors, with said capacitors being coupled to an output coupling means comprising a plurality of transmission line sections. By providing the second plurality of capacitors to couple the drain electrodes to the output terminal, the output impedance of each one of the

field effect transistors is concomitantly increased thereby permitting the periphery of the transistors to be correspondingly increased and thereby providing increased output power and gain from the amplifier circuit.

16 Claims, 7 Drawing Sheets



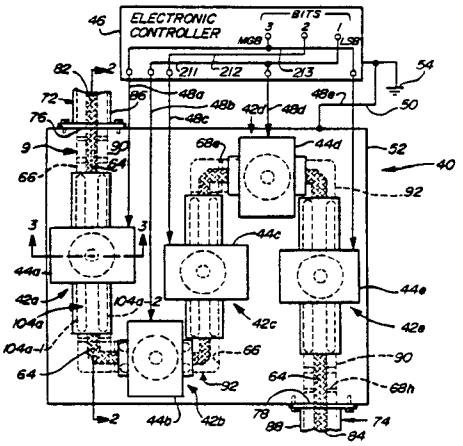
4,788,515 Nov. 29, 1988

Dielectric-Loaded Adjustable Phase-Shifting Apparatus

Inventors: Mon N. Wong and Donald C. D. Chang.
Assignee: Hughes Aircraft Company.
Filed: Feb 19, 1988.

Abstract—An adjustable phase-shifting apparatus for use in shifting the phase of a microwave signal transmitted along a TEM transmission line, such as coaxial line whose inner and outer conductors have square cross-sections. The apparatus includes a body with an elongated cavity therein which forms part of the outer conductor, and a cover attached to the body which forms at least part of the outer conductor. The cover has at least one pair of elongated openings that provide access to a portion of the cavity. The apparatus also includes a movable member provided with at least one pair of elongated, tapered, dielectric-loaded projections that slidably pass through the elongated openings and are positionable about either side of the center conductor to provide an adjustable phase lag A digital or analog actuator, such as a solenoid or motor driven cam, is provided to slide the projections in and out of the cavity in a direction normal to the signal's direction through the cavity to enable adjustment of the phase lag or shift. Multiple pairs of openings in the cover and corresponding pairs of dielectric projections may be used along a common extended cavity in the body to provide a series of selectable phase shifts in a single apparatus. A pair of such phase shifters may be interconnected by a see-saw linkage so that the phase shifts produced by the shifters are equal but opposite. Several such interconnected pairs of phase shifters may be used to provide the phase shifts required in a phased array antenna.

26 Claims, 7 Drawing Sheets



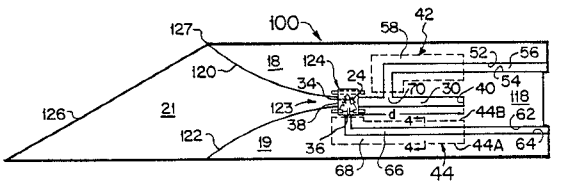
4,789,840 Dec. 6, 1988

Integrated Capacitance Structures in Microwave Finline Devices

Inventor: Robert D. Albin.
Assignee: Hewlett-Packard Company.
Filed: Apr. 16, 1986.

Abstract—A finline structure comprises a dielectric substrate-mounted circuit disposed within a waveguide having on the substrate integrated distributed capacitance elements at least, partially formed by laterally separated metallization layers. Thin-film construction techniques may be employed in construction In general, the distributed capacitance elements permit the biasing of a plurality of circuit elements in a finline transmission medium. In selected structures, RF continuity is effected between traces and metallization layers while maintaining dc isolation Examples are described of circuits which can incorporate an integrated capacitor, including but not limited to detectors, RF modulators, RF attenuators, amplifiers, and multipliers According to the invention, a plurality of elements, as well as multiple port elements, may be selectively biased while retaining dc isolation and RF continuity. Moreover, the versatility of construction allows for higher levels of integration as well as the realization of new topologies previously unattainable. Since the capacitance structure is integrated into the thin film circuit, fewer discrete parts are required and the manufacturing process may be precisely controlled by photolithography.

54 Claims, 7 Drawing Sheets



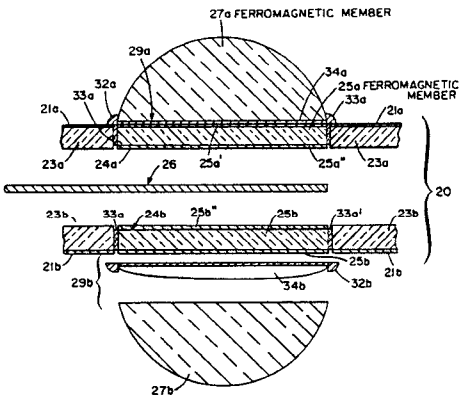
4,789,844 Dec. 6, 1988

Broad-Band Nonreciprocal Microwave Devices

Inventor: Ernst F. R. A. Schloemann.
Assignee: Raytheon Company.
Filed: May 29, 1987.

Abstract—A stripline circulator includes a pair of dielectrically supported ferrite discs and a pair of spaced hemispherical ferrite caps each one disposed over a corresponding one of the ferrite discs. The ferrite caps provide in combination with the ferrite discs a uniform dc magnetic field within the ferrite discs to reduce the insertion loss of the circulator at frequencies less than the so-called magnetization frequency of the ferrite material and thus, extend the operating bandwidth of the circulator. The ferrite caps are spaced from the ferrite discs by a thin layer of metallization having a thickness larger than the skin depth thickness of a microwave signal over the desired microwave frequency band. The ferrite discs are preferably comprised of signal crystalline ferrite materials oriented in a hard-axis orientation which generally is the [100] direction for materials where the first order anistropic constant K_1 is negative.

31 Claims, 8 Drawing Sheets



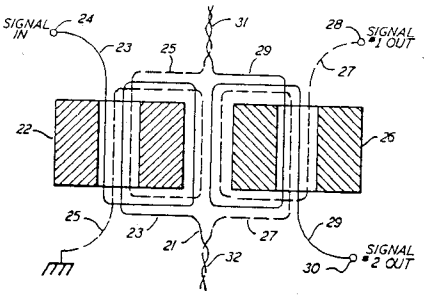
4,789,845 Dec. 6, 1988

Broad-Band Hybrid Signal Splitter

Inventor: Prabhakara Reddy.
Filed: Jan. 20, 1988.

Abstract—A signal splitter connects a radio frequency signal source to a pair of output loads, e.g., separate receivers, and has an increased high-end frequency response as compared to similar devices. First and second tubular cores are disposed side by side, each with a pair of toroidal windings therein. An input end of the first winding of the first core is coupled to the signal input and the second end of the second winding to ground, respectively, while output ends of the windings in the second core are connected to the output loads. The other ends of the windings of the two cores are respectively connected to one another to form two single-pair twisted connections. These are passed into through holes of a printed circuit board and are soldered or otherwise electrically connected to a printed conductor on the board. This construction reduces stray inductance significantly and also provides better mechanical mounting than previous devices. The two tubular cores could be fused as a single core with two holes.

5 Claims, 1 Drawing Sheet



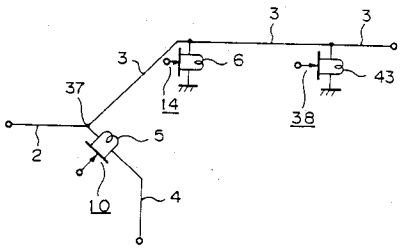
4,789,846 Dec. 6, 1988

Microwave Semiconductor Switch

Inventors: Makoto Matsunaga, Yoshitada Iyama, and Fumio Takeda.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: May 1, 1987.

Abstract—A microwave semiconductor switch wherein first and second field effect transistors and first, second, and third input/output microstrip lines are integrally formed on a semiconductor substrate. The first field effect transistor is connected in series between the second input/output line and a junction point of the first, second and third input/output lines at a position adjacent to the junction point. The second field effect transistor is connected at a second position spaced approximately a quarter of the wavelength from the junction point between the second position and the ground. The drain electrodes and source electrodes of the first and second transistors are placed at the same potential. The transmission paths for microwaves are switched by varying a bias voltage applied to the gate electrodes of the field effect transistors.

9 Claims, 5 Drawing Sheets



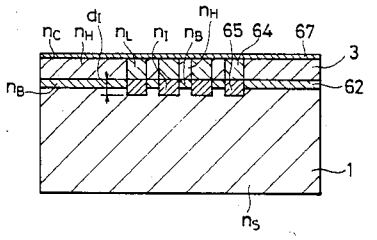
4,790,614 Dec. 13, 1988

Optical Filter and Optical Device Using Same

Inventors: Katsuyuki Imoto, Hirohisa Sano, and Minoru Maeda.
Assignee: Hitachi, Ltd.
Filed: Nov. 13, 1986.

Abstract—An optical filter is formed by providing a plurality of gaps, which have a desired width and such a depth that is larger than the thickness of the waveguide layer, in a slab or a waveguide layer in a three-dimensional optical waveguide so as to extend in the light propagating direction at desired period intervals. These gaps are filled with a film of a material, the refractive index of which is different from that of the waveguide layer, to complete the optical filter. A multiplex wavelength transmission device is formed monolithically by providing at least one optical filter, which is formed in the above-mentioned manner, in an optical waveguide, and arranging one or both of a light-emitting semiconductor element and a photodetector on the side of an optical signal which has passed through the optical filter, and on the side of an optical signal which has been reflected on the same optical filter.

17 Claims, 24 Drawing Sheets



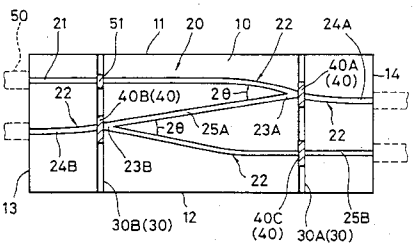
4,790,615 Dec. 13, 1988

Demultiplexing and/or Multiplexing Optical Circuit

Inventors: Masafumi Seki, Yoshiyuki Hanada, and Ryoichi Sugawara.
Assignee: Nippon Sheet Glass Co., Ltd.
Filed: Mar. 4, 1987.

Abstract—In a demultiplexing and/or multiplexing optical circuit of the invention, a groove for arranging a filter in an optical waveguide is arranged to be perpendicular to a pair of parallel opposing sides of a substrate for constituting the optical circuit. A plurality of demultiplexer and/or multiplexer can be formed simultaneously, and a high machining precision can be obtained relatively easily.

8 Claims, 8 Drawing Sheets



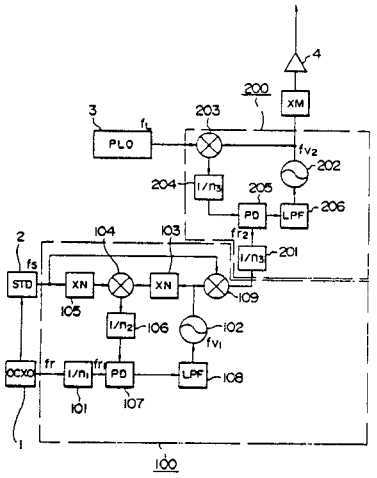
4,791,387 Dec. 13, 1988

Microwave Band Frequency Synthesizer

Inventors: Makoto Hasegawa, Kouei Misaizu, and Mitsuo Makimoto.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Dec. 15, 1987.

Abstract—A microwave band frequency synthesizer comprises first and second phase-locking loops The first phase-locking loop includes a first voltage controlled oscillator, a variable frequency divider and a first multiplier and generates an output signal whose frequency changes at the rate of a unit frequency change width of the oscillator. The second phase-locking loop includes a first fixed frequency divider for frequency-dividing the output signal of the first phase-locking loop to provide a phase comparison reference signal of a frequency higher than that phase-compared in the first phase-locking loop, a second voltage controlled oscillator, a second fixed frequency divider for frequency dividing an output of the second voltage controlled oscillator, a second phase comparator for phase-comparing a frequency-divided an output signal of the second fixed frequency divider and the phase comparison reference signal in order for phase-locking of the second voltage controlled oscillator, and a second multiplier for multiplying the output signal from the second voltage controlled oscillator to provide a microwave band signal.

1 Claim, 4 Drawing Sheets



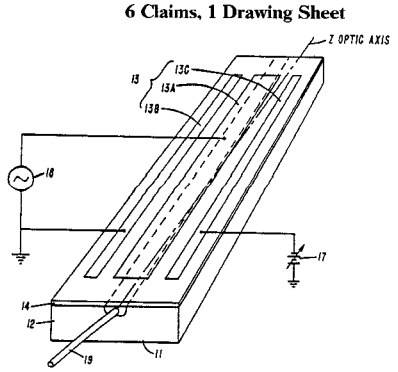
4,791,388 Dec. 13, 1988

Channel Waveguide Modulator

Inventors: Norman A. Sanford and Amaresh Mahapatra.
Assignee: Polaroid Corporation.
Filed: Apr. 27, 1987

Abstract—An optical modulator comprises a crystal whose top surface includes a channel waveguide whose axis makes an angle with the crystal optic axis larger than the critical angle for TE-polarized leaky mode propagation. An electrode structure overlies the top surface of the crystal for inducing mode conversion of TM-polarized waves propagating in the waveguide to lossy radiation modes.

6 Claims, 1 Drawing Sheet



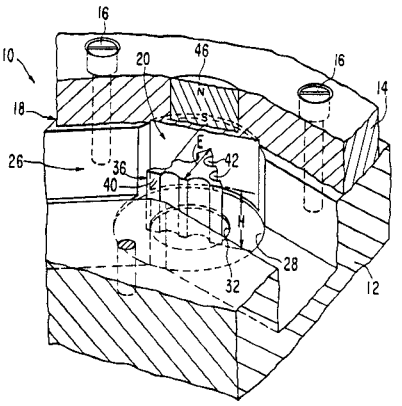
4,791,389 Dec. 13, 1988

Millimeter-Wave Circulator

Inventor: Paul H. Wolfert.
Assignee: Varian Associates, Inc.
Filed: May 27, 1987.

Abstract—A millimeter-wave wide-band circulator which employs a triangular ferrite prism with symmetrically grooved sides The prism is configured to support a pair of closely spaced higher order resonance mode sets which function to enlarge the bandwidth of the circulator and to suppress spurious mode resonances in the center and roll-off portions of the bandpass The simplicity of the junction design combined with the noncritical alignment requirement of the ferrite prism makes practical the fabrication of a multijunction millimeter-wave circulator in a single integrated housing.

17 Claims, 3 Drawing Sheets



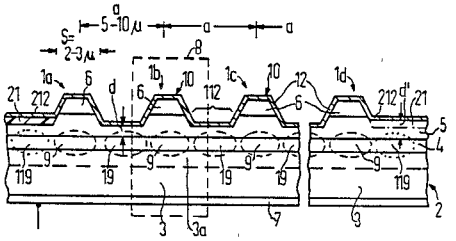
4,792,200 Dec. 20, 1988

Array of Coupled Optical Waveguides

Inventors: Markus-Christian Amann, Bernhard Stegmueller, and Franz Kappeler.
Assignee: Siemens Aktiengesellschaft.
Filed: Apr. 1, 1987.

Abstract—An array of coupled waveguides in the form of MCRW laser diodes and/or passive waveguides are coupled to one another by optical waves of the TM-mode occurring in semiconductor regions between the waveguides that have a reduced thickness d, the neighboring waveguides being provided at a spacing a

11 Claims, 1 Drawing Sheet



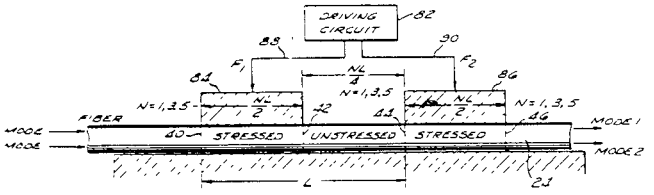
4,792,207 Dec. 20, 1988

Single-Mode Fiber-Optic Single-Sideband Modulator and Method of Frequency Shifting Using Same

Inventors: Herbert J. Shaw, Robert C. Youngquist, and Janet L. Brooks.
Assignee: The Board of Trustees of the Leland Stanford Junior University.
Filed: May 15, 1987.

Abstract—A fiber-optic frequency shifter comprising two waveguides having different indices of refraction. In some embodiments the waveguides are two modes of propagation in one fiber Plural distributed coupling ridges, or electrodes mounted adjacent piezoelectric materials, are independently driven to apply sinusoidally varying forces to the fiber. In some embodiments, the phase relationship of the driving signals for the electrodes or ridges is such that a traveling acoustic wave is launched in the fiber In other embodiments, regions of stress in the fiber are created by an acoustic wave coupled into the fiber from a transducer coupled to an acoustic medium surrounding the fiber. The input carrier light is shifted in frequency by the frequency of the acoustic wave.

3 Claims, 14 Drawing Sheets



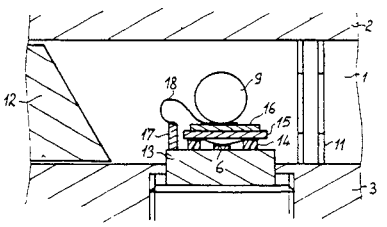
4,792,769 Dec. 20, 1988

Microwave Oscillator Integrated in a Waveguide

Inventors: Narquise Mamodaly and Jean Stevance.
Assignee: Thomson Hybrides et Microondes
Filed: Mar 14, 1988.

Abstract—A microwave oscillator integrated in a waveguide includes a negative-resistance diode encapsulated in a capped micromodule, a capacitor fixed on the cap, a resonator fixed on the capacitor and a metallic strip fixed on the capacitor and on a grounding stud. The metallic strip constitutes a device for coupling the diode with the auxiliary load and with the resonator Outside the resonance frequency of the resonator, no oscillation is possible since the diode is in that case loaded by a low resistance and is not capable of oscillating. The dielectric resonator is the only element which resonates, thus endowing the oscillator with high stability.

6 Claims, 2 Drawing Sheets



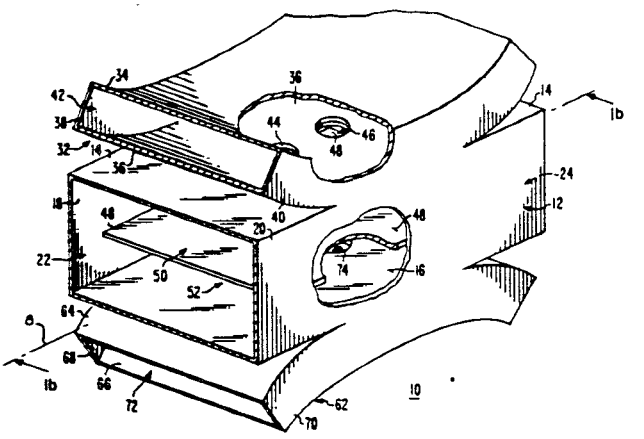
4,792,770 Dec. 20, 1988

Waveguide Directional Coupler with Multiple Coupled Outputs

Inventors: Sharad V. Parekh, Seymour W Shapiro, and Charles E. Profera, Jr.
Assignee: General Electric Company.
Filed: June 29, 1987

Abstract—A reduced size waveguide directional coupler assembly includes a first rectangular waveguide which is adapted to receive signal at an input port. A conductive septum parallel with a broad wall of the rectangular waveguide divides the signal into two portions flowing in first and second channels within the first waveguide The septum may be centered between the broad walls, in which case the two signal portions and channel dimensions are the same, or the septum may be off-center, resulting in dissimilar amplitudes of the two signal portions The coupler also includes a second waveguide. Branch waveguides or other coupling apertures open from the first channel into the second waveguide. That energy not flowing to the second waveguide from the first channel may be routed to an independent output port, or may be recombined with the energy flowing in the second channel and routed to a combined output port. The coupler may include a third waveguide coupled by branch waveguides or other coupling apertures to the second channel. That energy not coupled from the second channel to the third waveguide may be coupled to an independent output port, or may be recombined with the residual energy from the first channel at a combined output port. A load may be coupled to the septum to dissipate unbalanced power.

17 Claims, 7 Drawing Sheets



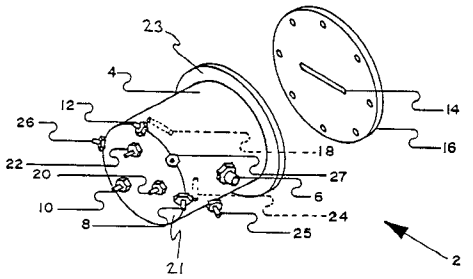
4,792,771 Dec. 20, 1988

Quadruple-Mode Filter

Inventor: David Siu.
Assignee; Com Dev Ltd
Filed: Feb 17, 1987.

Abstract—A quadruple-mode bandpass filter has at least one cavity resonating in four independent orthogonal modes simultaneously. Preferably, the filter has two cavities, one cavity being a quadruple-mode cavity and the remaining cavity being either a single mode, dual mode, triple mode or quadruple-mode cavity By introducing a resonant feedback coupling into filters of the present invention, the number of transmission zeros produced by the filter is equal to the order of the filter. Previous filters have cavities resonating in either a single, dual, or triple mode and the maximum number of transmission zeros is equal to the order of the filter minus two

29 Claims, 15 Drawing Sheets



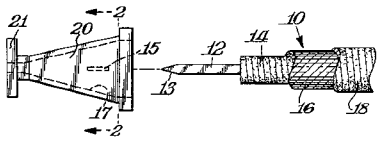
4,792.774 Dec. 20, 1988

Dielectric Waveguide Having Higher Order Mode Suppression Filters

Inventors: Jeffrey A. Walter, Kailash C. Garg, and Joseph C. Rowan.
Assignee: W. L. Gore & Associates, Inc.
Filed: Sept. 29, 1987

Abstract—A dielectric waveguide for the transmission of electromagnetic waves is provided comprising a core of polytetrafluoroethylene (PTFE), one or more layers of PTFE cladding overwrapped around the core, the core and/or cladding having more suppression filters of an electromagnetically glossy material embedded therein, and an electromagnetic shielding layer covering the cladding. The mode suppression filters are preferably mica cards.

19 Claims, 1 Drawing Sheet



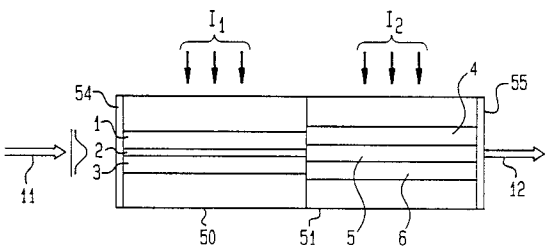
4,794,346 Dec. 27, 1988

Broad-band Semiconductor Optical Amplifier Structure

Inventor: Stewart E. Miller.
Assignee: Bell Communications Research, Inc.
Filed: Jan. 26, 1988.

Abstract—The broad-band semiconductor optical amplifier fabricated in accordance with the teachings of the present invention comprises first and second active semiconductor regions (50, 51) disposed in tandem with each other, and means for injecting current (I_1,I_2) into the first and second active semiconductor regions to provide gain distributions over wavelength regions in the two active semiconductor regions which partially overlap to form a combined gain distribution over a wider range of wavelengths. Anti-reflection coatings (54, 55) are disposed on the extreme ends of the combined structure. Tunable wavelength selective amplification over the wider range is achieved in various embodiments by including a tunable optical bandpass filter (53) or by including a various tunable auxiliary light guiding structures (115, 116; 140; or 450) to which and from which light power is coupled from and to the active semiconductor regions of the amplifier, respectively.

31 Claims, 4 Drawing Sheets



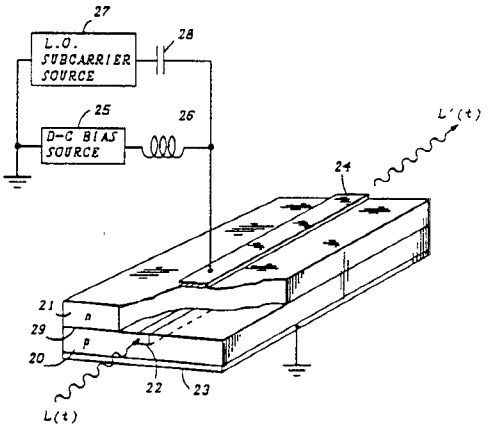
4,794,351 Dec. 27, 1988

Optical Mixer for Up-Converting or Down-Converting an Optical Signal

Inventor: Thomas E. Darcie.
Assignee: American Telephone and Telegraph Company, AT&T Bell Laboratories.
Filed: Sept. 29, 1986.

Abstract—The present invention relates to an optical up-converting or down-converting gain or loss modulating mixer and a receiver for subcarrier optical communication systems using this mixer. The optical mixer can be formed, for example, from an optical amplifier including a semiconductor laser chip comprising a p-n junction with an active region channel formed along the junction. An optical signal received from the communication system is directed into one end of the channel, and a combination of a dc bias signal and a local oscillator signal is concurrently impressed on the chip to gain-modulate the received optical signal and produce an up-converted or down-converted output signal. In the receiver, the up-converted or down-converted output signal from the gain-modulated optical amplifier is detected by a photo detector, amplified if necessary, filtered and then demodulated before transmission to the output utilization device. A loss modulator provides similar optical mixing but does not provide a gain to the output signal.

8 Claims, 4 Drawing Sheets



4,794,352 Dec. 27, 1988

High-Power Junction Circulator for High Frequencies

Inventors: Günter Mörz and Wolfgang Weiser.
Assignee: ANT Nachrichtentechnik GmbH.
Filed: Oct. 2, 1987.

Abstract—In a high-power, high-frequency junction circulator which includes a cooled ferrite structure disposed in a microwave junction zone where it is subjected to a static magnetic field, the ferrite structure is composed of a plurality of stacked ferrite balls. A coolant flows around the balls to carry away heat.

11 Claims, 2 Drawing Sheets