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.

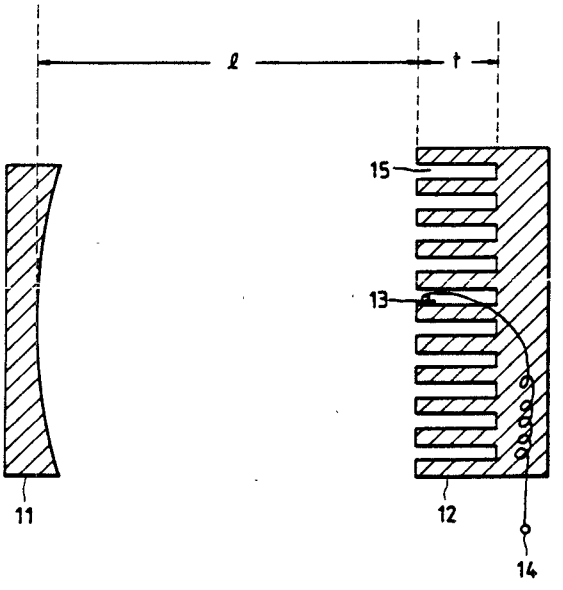
4,906,945 Mar. 6, 1990

Millimeter-Wave/Submillimeter-Wave Oscillator

Inventors: Koji Mizuno, Haruyoshi Endo, and Mitsuo Makimoto.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Apr. 20, 1989.

Abstract—There is disclosed herein a millimeter-wave/submillimeter-wave oscillator comprising a mirror and a diffraction grating so as to form a Fabry-Perot type resonator. The mirror, being a concave mirror or a plane mirror, and the diffraction grating are disposed in facing and spaced relation to each other. The diffraction grating has a plurality of channels extending in a direction normal to a surface of the mirror so that the oscillator has a comb-like configuration. A plurality of oscillation elements are mounted on portions within the channels of the diffraction grating.

12 Claims, 3 Drawing Sheets



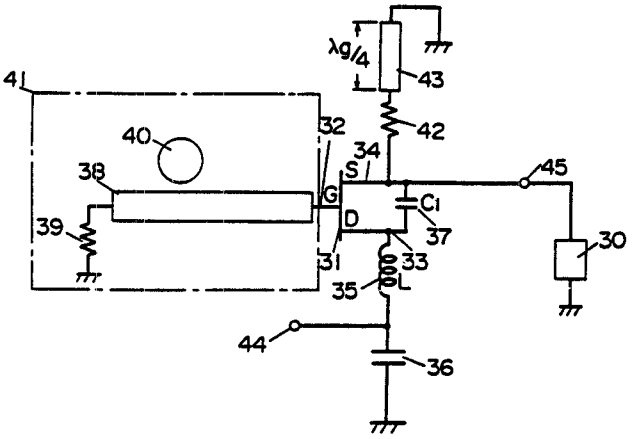
4,906,946 Mar. 6, 1990

Microwave Oscillator Having Series and Parallel Feedback

Inventors: Tsuyoshi Mekata, Hiroshi Saka, and Toshihide Tanaka.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Sept. 23, 1988.

Abstract—A feedback type microwave oscillator using a three-terminal active element employs both series feedback and parallel feedback and capacitance in its output circuit, thereby increasing the small signal negative resistance, and the output power and its resistance to impedance fluctuations of a load attached thereto.

14 Claims, 16 Drawing Sheets



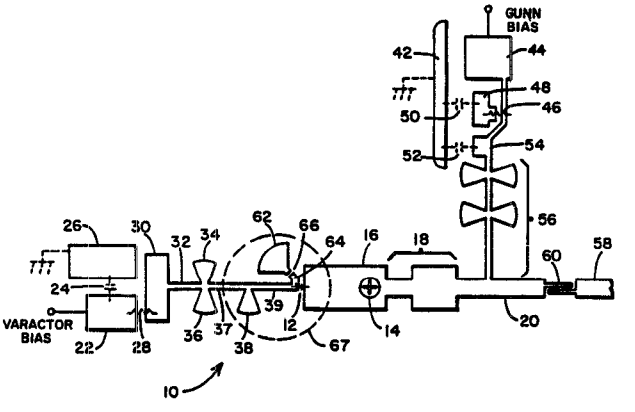
4,906,947 Mar. 6, 1990

Millimeter Wave Microstrip Voltage-Controlled Oscillator with Adjustable Tuning Sensitivity

Inventors: Rebecca A. Hart, John R. Lamberg, and Donald R. Singh.
Assignee: Honeywell, Inc.
Filed: Mar. 13, 1989.

Abstract—A voltage-controlled oscillator (VCO) especially designed for use in the millimeter wave frequency band (Ka-band) and which exhibits an adjustable tuning sensitivity. A low tuning sensitivity is easily obtained, making it suitable for narrow-band FMCW applications. It comprises a Gunn diode as a negative resistance device and a voltage variable capacitance diode (varactor) as a tuning element. A fixed capacitance element is coupled in RF series with the varactor and microstrip transmission lines are configured to function as impedance matching, resonating and filtering elements. By incorporating the fixed capacitance in RF series with the varactor, the tuning sensitivity, measured in volts/Hz is markedly reduced. The VCO uses a novel RF structure which puts the fixed capacitance in RF series with the varactor, without introducing the fixed capacitance element in the varactor bias circuitry.

3 Claims, 1 Drawing Sheet



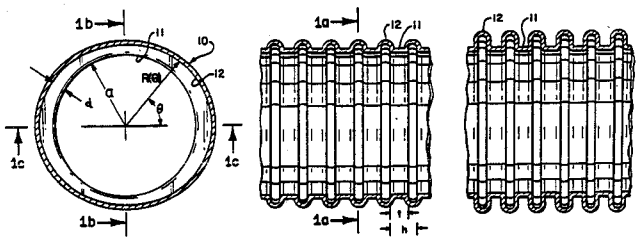
4,906,951 Mar. 6, 1990

Birefringent Corrugated Waveguide

Inventor: Charles P. Moeller.
Assignee: United States Department of Energy.
Filed: Feb. 15, 1989.

Abstract—A corrugated waveguide having a circular bore and noncircularly symmetric corrugations, and preferably elliptical corrugations, provides birefringence for rotation of polarization in the HE_{11} mode. The corrugated waveguide may be fabricated by cutting circular grooves on a lathe in a cylindrical tube or rod of aluminum of a diameter suitable for the bore of the waveguide, and then cutting an approximation to ellipses for the corrugations using a cutting radius R_0 from the bore axis that is greater than the bore radius, and then making two circular cuts using a radius R_1 less than R_0 at centers $+b$ and $-b$ from the axis of the waveguide bore. Alternatively, stock for the mandrel may be formed with an elliptical transverse cross section, and then only the circular grooves need be cut on a lathe, leaving elliptical corrugations between the grooves. In either case, the mandrel is first electroplated and then dissolved leaving a corrugated waveguide with noncircularly symmetric corrugations. A transition waveguide is used that gradually varies from circular to elliptical corrugations to couple a circularly corrugated waveguide to an elliptically corrugated waveguide.

6 Claims, 4 Drawing Sheets



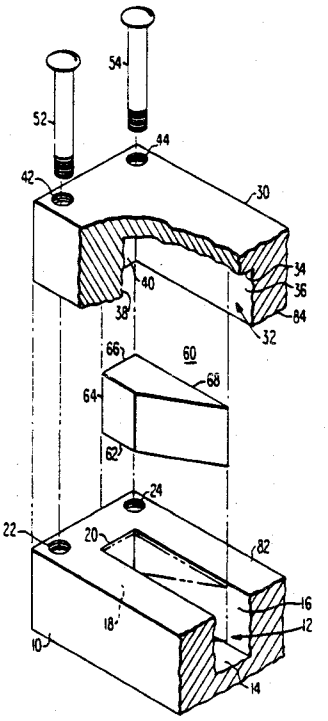
4,906,952 Mar. 6, 1990

Asymmetric Waveguide Load

Inventors: Krishna Praba and Stephen Scalph.
Assignee: General Electric Company.
Filed: June 19, 1985.

Abstract—A waveguide termination includes a rectangular waveguide having a pair of spaced-apart broad walls and a pair of narrow walls equally spaced from a plane of symmetry. The termination has a block or wedge of absorber material. The width of the absorber material is approximately half the width of the waveguide as measured between the narrow walls. The absorber material is located asymmetrically in the waveguide so that substantially all of the absorber material is on one side of the plane of symmetry.

14 Claims, 6 Drawing Sheets



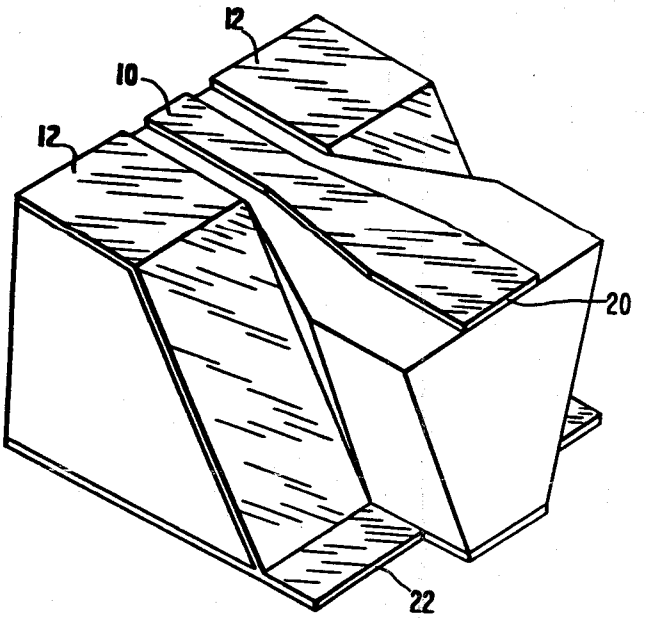
4,906,953 Mar. 6, 1990

Broadband Microstrip to Coplanar Waveguide Transition by Anisotropic Etching of Gallium Arsenide

Inventors: Chia-Geng Li, Steve G. Bandy, and Majid Riaziat.
Assignee: Varian Associates, Inc.
Filed: Sept. 8, 1988.

Abstract—A broadband interconnection between a microstrip and a coplanar waveguide is provided without use of via holes by using anisotropic etching to form a sloped surface between connection points. The sloped surface is then metallized to provide the interconnection.

3 Claims, 5 Drawing Sheets



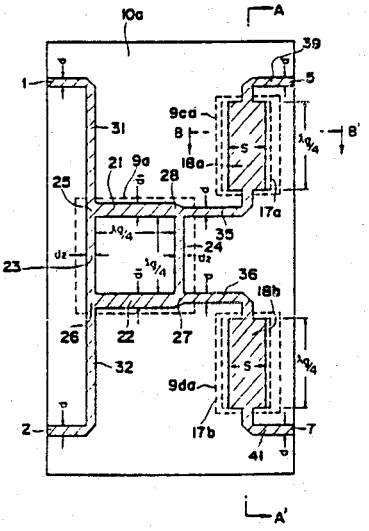
4,906,954 Mar. 6, 1990

Directional Coupler Device

Inventors: Toshiaki Tanaka and Masayoshi Aikawa.
Assignee: ATR Optical and Radio Communications Research Laboratories.
Filed: May 30, 1988.

Abstract—The present invention relates to a multi terminal directional coupler combined by a plurality of directional couplers. Two directional coupling conductors form each of the directional couplers and are provided on both side faces of a ground conductor through dielectric substrates so as to oppose each other. Openings are defined on the ground conductor corresponding to the coupling conductors so that the coupling conductors are electrically coupled through the openings. Therefore, interference between transmission lines situated on both sides of the ground conductor can be prevented and the multi terminal directional coupler can be made small in size and weight.

6 Claims, 24 Drawing Sheets



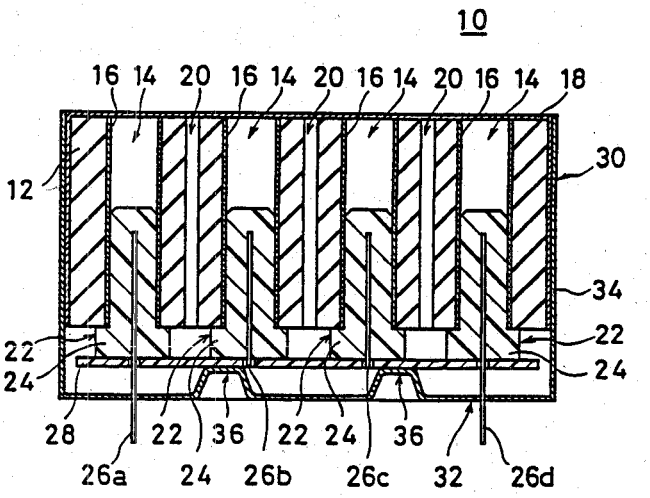
4,906,955 Mar. 6, 1990

Dielectric Filter

Inventors: Tadahiro Yorita and Takashi Maruyama.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 8, 1988.

Abstract—A dielectric filter includes a plurality of coaxial resonators constituted by inner conductors formed on inner walls of a plurality of throughholes which are formed in parallel with each other on a dielectric block and an outer conductor which is formed on an outer surface of the dielectric block. A printed circuit board is disposed at a side of an open end of the dielectric block, and the printed circuit board and the dielectric block are accommodated in a metallic case which is electrically connected to the outer conductor. A projecting portion is formed on an inner surface of the metallic case to support the printed circuit board such that a predetermined gap can be formed between the printed circuit board and a bottom surface of the metallic case by the projecting portion, whereby a stray capacity is reduced. Therefore, it is possible to prevent resonant frequencies of the coaxial resonators from being changed or fluctuated, and thus a filter characteristic of the dielectric filter becomes good.

5 Claims, 2 Drawing Sheets



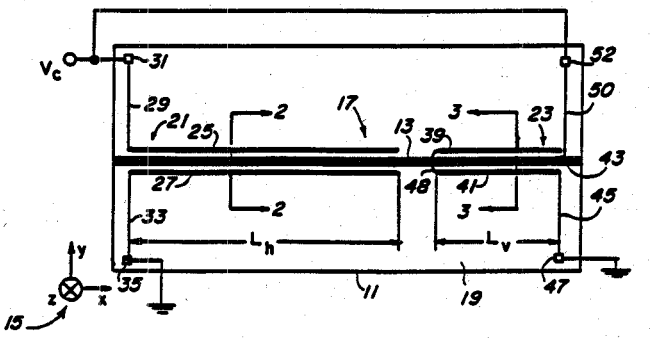
4,907,849 Mar. 13, 1990

Integrated-Optic, Polarization-Selective Phase Modulator

Inventors: Alan D. Kersey, Catherine Bulmer, and Anthony Dandridge.
Filed: The United States of America as represented by the Secretary of the Navy.

Abstract—An integrated-optic, polarization-selective phase modulator is disclosed. In a preferred embodiment of the invention a channel waveguide provides a path therethrough for polarized light having horizontal and vertical polarization components, and an electrode structure is disposed above the channel waveguide and is responsive to the application of a control voltage to the electrode structure for substantially phase modulating only the vertical component of the polarized light.

9 Claims, 1 Drawing Sheet



4,907,850 Mar. 13, 1990

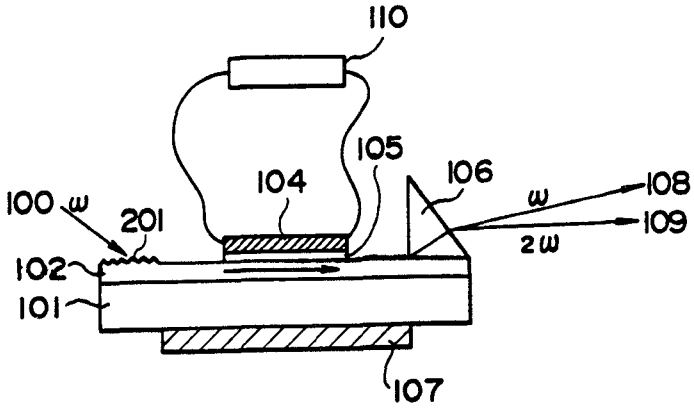
Apparatus for Periodically Generating Second Harmonic

Inventors: Keisuke Araki and Kenichi Ohta.
Assignee: Canon Kabushiki Kaisha.
Filed: Jul. 12, 1988.

Abstract—An apparatus for periodically generating a second harmonic light comprises: a light source; and means for converting a fundamental

wavelength light emitted from said light source to a second harmonic light, including optical wave guide means having a light propagation area and means for periodically varying a refractive index of the light propagation area.

6 Claims, 5 Drawing Sheets



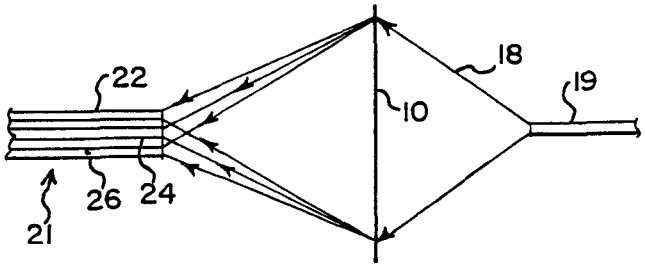
4,907,851 Mar. 13, 1990

Single-Mode 1 × *N* Holographic Fiber Optics Coupler

Inventor: Michel E. Marhic.
Assignee: Northwestern University
Filed: Sept. 22, 1987.

Abstract—A holographic 1 × *N* single-mode fiber optics coupler for coupling a single-mode monochromatic fiber optics input to *N* single-mode fiber optics outputs. A hologram of the output fiber bundle or the equivalent is recorded and then a reconstructed image is generated by illuminating the hologram by means of a single-mode input signal on a single-mode optical fiber. The holographically generated image of the original fiber optics bundle is then coupled to the original fiber bundle or a substantially equivalent output fiber optics bundle providing a high efficiency, compact, and low cost 1 × *N* fiber optics coupler with self-alignment features.

15 Claims, 2 Drawing Sheets



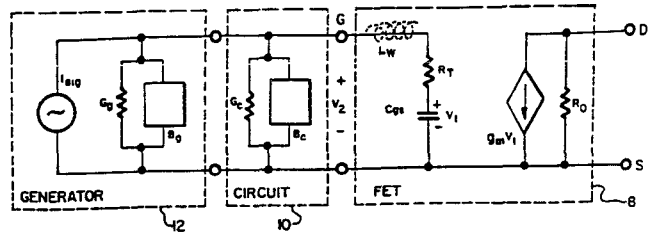
4,908,570 Mar. 13, 1990

Method of Measuring FET Noise Parameters

Inventors: Madhu S. Gupta, Paul T. Greiling, Steven E. Rosenbaum, and Octavius Pitzalis.
Assignee: Hughes Aircraft Company.
Filed: June 1, 1987.

Abstract—A method is described for measuring the noise parameters of field effect transistors (FETs) while still in the wafer stage. Instead of conducting lengthy testing of each individual device at the operating frequency of interest after the devices have been diced, mounted and bonded, each of the devices on a wafer is automatically probed to obtain the standard *S*-parameters and also the FET's output noise power P_n at a frequency at which parasitic probe effects are avoided. The various noise parameters can then be calculated for higher operating frequencies of interest from FET equivalent circuit parameters derived from the *S*-parameters, and from P_n, either before or after dicing.

27 Claims, 4 Drawing Sheets



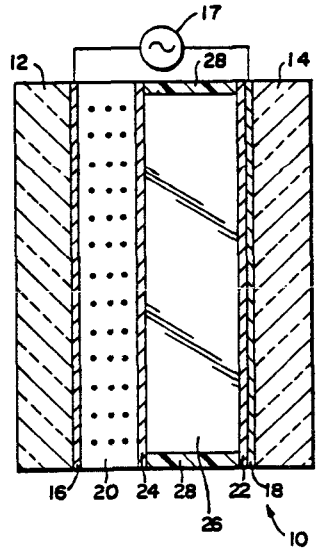
4,908,584 Mar. 13, 1990

Spatial Light Modulator Using Surface State Photodiodes

Inventor: Joseph Reichman.
Assignee: Grumman Aerospace Corporation.
Filed: June 7, 1988.

Abstract—A surface state photodiode is used as the photosensitive element for a spatial light modulator, which includes a liquid crystal layer. The surface of the photodiode which faces the liquid crystal layer has formed thereon surface states, by means of adsorption of foreign molecules to create a depletion layer, thereby effecting a high dark impedance region. Such a spatial light modulator provides for a high resolution image and simplicity in manufacture.

10 Claims, 3 Drawing Sheets



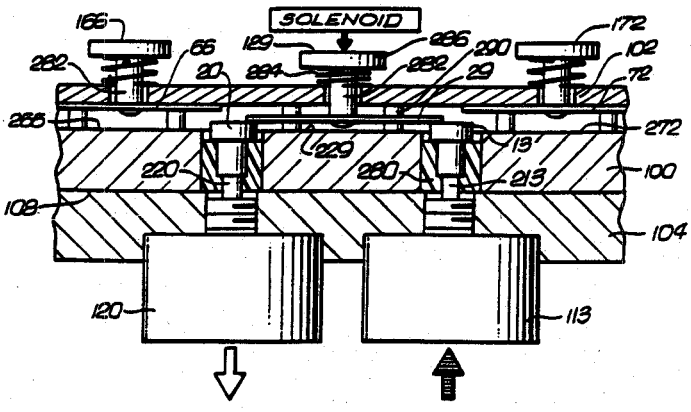
4,908,588 Mar. 13, 1990

Matrix Switch

Inventors: Jerzy Hoffman, and Krzysztof J. Ciezarek.
Assignee: Hu Development Corporation.
Filed: June 2, 1988.

Abstract—A matrix switch is provided having a plurality of input and output conductors adjacent each other such that an input connector may be connected to one of many output connectors upon actuation of a single movable conductor. Transfer conductors disposed adjacent to the input and output connectors allows the input connector to be electrically coupled to the remaining output connectors.

12 Claims, 11 Drawing Sheets



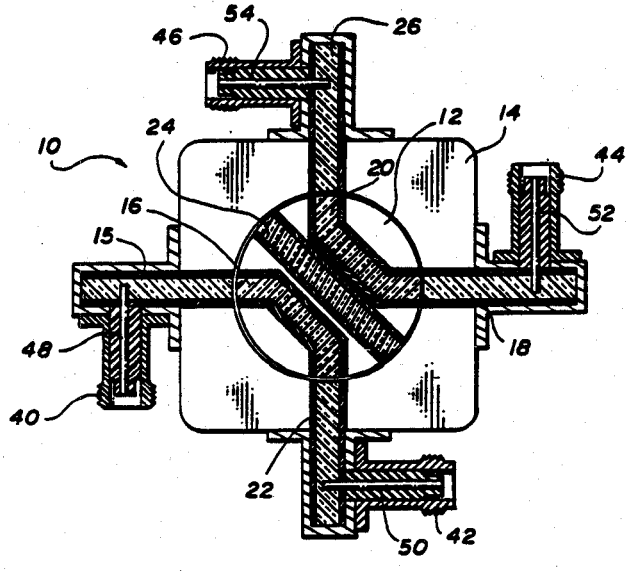
4,908,589 Mar. 13, 1990

Dielectrically Loaded Waveguide Switch

Inventors: Richard V. Basil, Jr. and Juri G. Leetman
Assignee: Hughes Aircraft Company.
Filed: Sept. 21, 1987.

Abstract—A dielectrically loaded waveguide switch is disclosed which provides high power handling capability, small size and low weight. The invention includes first and second dielectrically loaded waveguides selectively connected by a switch. In a specific embodiment of the invention, the switch includes a third dielectrically loaded waveguide mounted for communication with said first and second waveguides upon switch actuation.

12 Claims, 1 Drawing Sheet



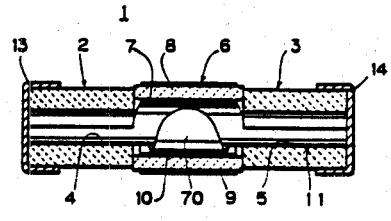
4,908,590 Mar. 13, 1990

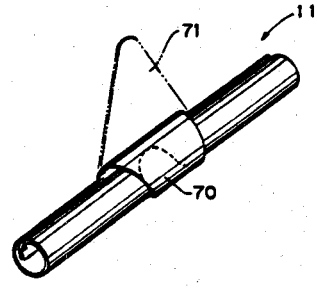
Chip-Like *LC* Filter

Inventors: Yukio Sakamoto, Shinichi Madokoro, and Shingo Okuyama.
Assignee: Murata Manufacturing Co.
Filed: Apr. 15, 1988.

Abstract—A chip-like *LC* filter which comprises a cylindrical magnetic element having a through hole. A cylindrical capacitor element has a through hole and terminal electrodes formed on inner and outer peripheral surfaces thereof. A central conductor is inserted in the through holes of the magnetic element and the capacitor element, which through holes are aligned along an axial direction. The terminal electrode on the inner peripheral side of the capacitor element is electrically connected with the central conductor. Cap-shaped external terminal members are respectively provided on both end portions of the central conductor, so that the magnetic element and the capacitor element are located between the external terminal members. The central conductor is obtained by cylindrically rolling a metal plate, so that a portion located on the outer periphery of the rolled metal plate defines an elastic contact portion that elastically comes into pressure contact with the terminal electrode on the inner peripheral surface of the capacitor element.

18 Claims, 3 Drawing Sheets





4,909,612 Mar. 20, 1990

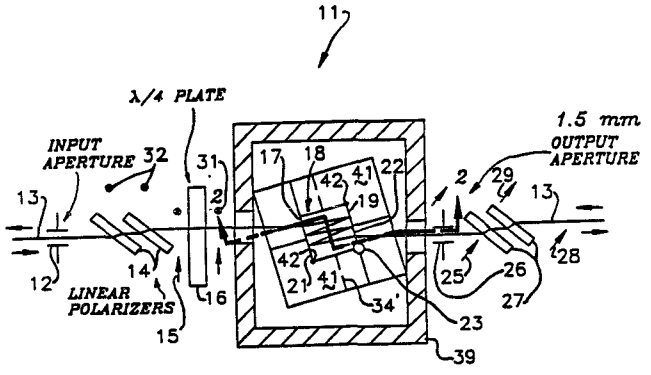
Optical Isolator Employing Multipass Faraday Rotation

Inventors: David G. Scerbak, John Dutcher, Robert L. Mortensen, Richard W. Wallace, and M. Grossman
Assignee: Lightwave Electronics Co.
Filed: July 14, 1986.

Abstract—An optical Faraday isolator includes a slab of Faraday rotator medium coated to define input and output faces and internal reflective surfaces for causing the beam to travel between the input and output faces along a zig-zag path. Permanent magnets polarized in a direction normal to the plane defined by the zig-zag beam path are disposed on opposite sides of the beam path. The magnets are paired on each side with serially alternating

polarity and the like poles are in transverse registration on opposite sides of the beam path to produce an intense, unidirectional magnetic field parallel to the beam path within the rotator slab. A quarterwave plate introduces a compensating amount of elliptical polarization to cancel unwanted elliptical polarization effects of the slab and its coatings. A beam shaving aperture at the exit of the slab shaves off divergent backward traveling rays.

9 Claims, 1 Drawing Sheet



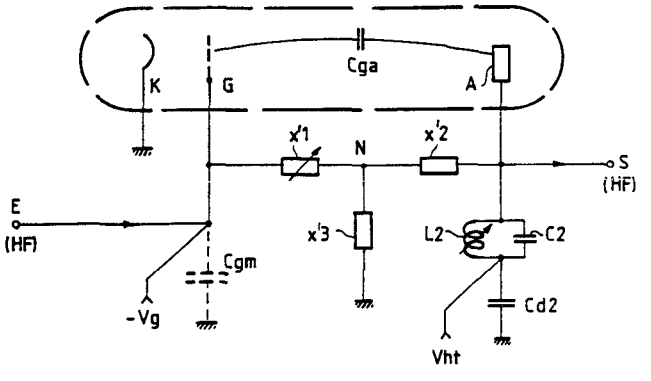
4,910,476 Mar. 20, 1990

High-Frequency Amplifier with Automatic Neutrodyning Circuit

Inventors: Michel Benoit, and Guy Peillex-Delphe.
Assignee: Thomson-CSF.
Filed: Oct. 14, 1988.

Abstract—High frequency amplifiers require neutrodyning to prevent the risks of self-oscillation generated by the existence of stray capacitances among the electrodes of the active component used in the amplifier. Grid tube amplifiers (such as triodes, tetrodes, pentodes, etc.) are more particularly concerned. Instead of simply providing a variable inductive element, in parallel, on the stray capacitance between the input electrode and the output electrode, there is provided a star connection of three reactances between the input electrode, the output electrode and the reference electrode. Only the first reactance is variable. The others are fixed and are in a constant ratio independent of the frequency. Preferably, the variable reactance element is an inductive element, and the other two are capacitive elements. Thus, by means of this single, variable reactance element, it is possible to make a setting, at the same time, of the input or output frequency tuning of the amplifier and of the neutrodyning.

12 Claims, 5 Drawing Sheets



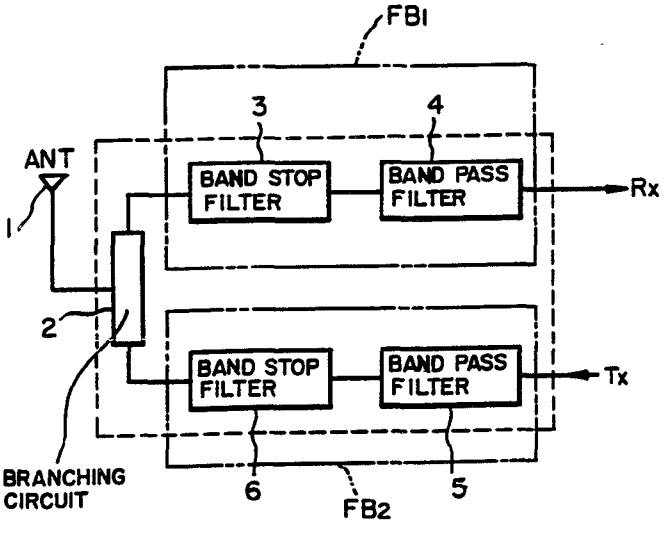
4,910,481 Mar. 20, 1990

Branching Filter

Inventors: Kanemi Sasaki, Sadao Ogawa, Mikio Takano, and Kennzo Urabe.
Assignee: Kokusai Denki Kabushiki Kaisha.
Filed: Dec. 12, 1988.

Abstract—A branching filter for separating or combining two different frequencies without interference in radio communication equipment, etc. One or both of two filter blocks for separating or combining two signal waves whose central frequency differ from each other are constructed from a dielectric bandpass filter which allows the desired wave of a block to pass and a SAW band stop filter being connected in series with said filter which allows the desired wave of a block to pass and stops passing of the desired wave of another block.

2 Claims, 4 Drawing Sheets



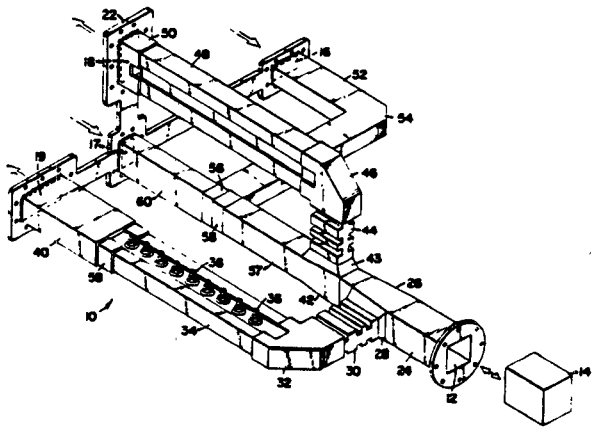
4,912,436 Mar. 27, 1990

Four Port Dual Polarization Frequency Diplexer

Inventors: James L. Alford and Robert E. Terry.
Assignee: Gamma-F Corporation.
Filed: June 15, 1987.

Abstract—A diplexer for communicating signals in two different frequency bands with separate polarizations in each band may, for example, concurrently separate low frequency received signals or orthogonal polarizations from high frequency transmitted signals, also of orthogonal polarizations. To this end a common square waveguide leads to serially disposed, axially displaced, orthogonal mode transitions at which branches are made to closely coupled lowpass filters that communicate with separate ports for low frequency signal bands. A smaller square waveguide coupled to the second of the orthogonal mode transitions communicates with another orthogonal mode transition at which axially displaced branches communicate with other ports for high frequency signal bands.

5 Claims, 2 Drawing Sheets



4,912,437 Mar. 27, 1990

Stripline Circuit and Method for Regulating the Characteristics Thereof

Inventor: Lauri Kuokkanen.
Assignee: Solitra Oy.
Filed: Nov. 22, 1988.

Abstract—The invention relates to a stripline circuit comprising a stripline structure of a high-conductive material disposed on the surface of a board of a dielectric material, as well as a method for regulating such a stripline circuit. The invention is characterized in that a metallic or metal coated cover (4) is nonconductively provided in the vicinity of the stripline structure (2), the distance of the cover from the stripline being adjustable to regulate the characteristic impedance of the stripline. The distance of the cover from the stripline is preferably adjusted by bending the cover (4).

8 Claims, 1 Drawing Sheet