

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.

4,775,845

Oct. 4, 1988

Microwave Oscillator with External Feedback

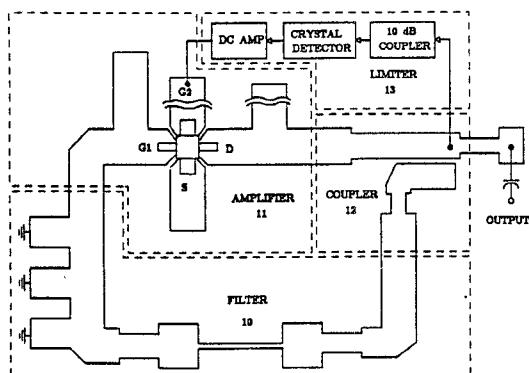
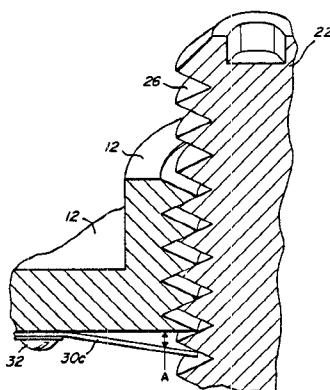
Inventor: Jody A. McCoy.
Filed: Apr. 24, 1987.

Abstract—The present invention provides an alternative circuit for microwave oscillators. The invention consists of an amplifier, signal divider, filter(s), and optional limiter. The feedback path is external to the amplifier, allowing direct access and control of the loop phase and loop gain. Control of the loop gain can be used for applications such as amplitude modulation of the oscillator's output or control of the oscillator's output power. Control of the loop phase can be used to frequency modulate the oscillator or to create a voltage-controlled oscillator. Dynamic control of the loop gain with a limiter enables one to maintain linear operation throughout the oscillator. Linear operation is often desirable to eliminate the $1/f$ noise contributions at the frequency of operation and to enable the use of small signal s -parameters in the design and analysis.

20 Claims, 7 Drawing Sheets

tions are deflected in cantilever fashion so as to generate sufficient pressure to break through any oxides in the tuning element threads and ensure metal-to-metal contact

19 Claims, 2 Drawing Sheets



4,775,847

Oct 4, 1988

Tunable Resonant Cavity Filter Structure with Enhanced Ground Return

Inventors: Robert L. Epsom, Terry K. Mansfield, Anthony M. Pirih, Scott J. Prop, and Thomas L. Spicer.
Assignee: Motorola, Inc.
Filed: Dec. 9, 1986.

Abstract—A tunable resonant cavity filter structure is disclosed which includes an enhanced ground return internal to the cavity which effectively eliminates generation of deterioration wide band noise and optimizes unloaded Q as well as rendering resonant frequency stable with vibration. In its preferred form, the enhanced ground return is in the form of a ground return clip with radial projections that mate with the threads of the threadable tuning element used to determine final operating frequency. The radial projec-

4,776,657

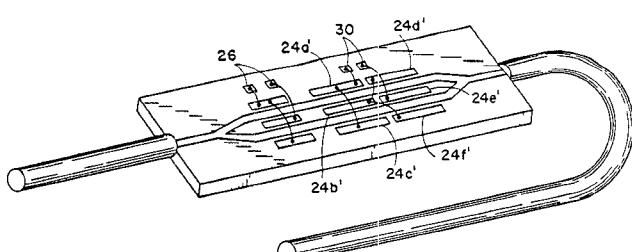
Oct. 11, 1988

Electro-Optic Phase Shifter with Reduced Input Capacitance

Inventor: Thomas M. Reeder.
Assignee: Tektronix, Inc.
Filed: Mar. 25, 1986.

Abstract—An optical phase shifter comprises an optical waveguide of electro-optic material and an electrode structure associated with the waveguide for imposing an electrical field on the waveguide. The electrode structure comprises at least two groups of electrodes, each group having at least first and second electrodes between which the waveguide passes. The first electrode of one group and the second electrode of the other group are on opposite respective sides of the waveguide and are connected to respective input terminals for receiving an electrical signal. The second electrode of the one group is connected to the first electrode of the other group.

4 Claims, 1 Drawing Sheet



4,776,660

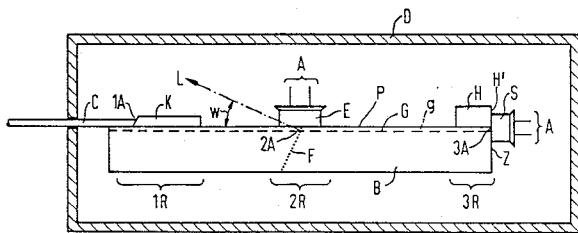
Oct. 11, 1988 4,777,456

Oct. 11, 1988

Light Diplexer of a Communication System Comprising Three Light Connections

Inventors: Hans F. Mahlein, Herbert Michel, Achim Reichelt, and Gerhard Winzer.
Assignee: Siemens Aktiengesellschaft.
Filed: Jan. 27, 1987.

Abstract—A light branching element or diplexer comprising a first bidirectional light connection and a second and third unidirectional light connection. The unit is formed by a block having a straight surface groove with an embedded glass fiber which fiber is interrupted by a partially transmissive mirror lying on a slanting plane relative to the axis of the fiber. The light sensitive location of a light receiving semiconductor element is secured to the block adjacent to the mirror and the plane of the mirror is selected so that its normal extends out of the block at an angle of incidence smaller than 45° to the axis of the fiber to reduce reflections from the semiconductor member back to the mirror and into the fiber.



4,777,454

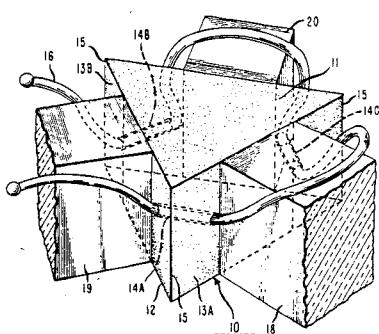
Oct. 11, 1988

Switchable Dielectric Waveguide Circulator

Inventors: Richard A. Stern and Richard W. Babbitt.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: July 6, 1987.

Abstract—A switchable dielectric waveguide circulator is provided for millimeter wave frequency applications comprising a ferrite right prism having two polygonal prism bases and at least three lateral prism faces. A control wire is threaded through a number of bores formed in the prism in a plane between the bases. Each of the bores is spaced a distance from a different one of the apices of the prism so that a control current passing through the control wire creates a circular magnetic field about each bore which combine to form a resultant magnetic field between the prism bases which cause the prism faces to act as circulator ports. The rotational direction of circulator coupling action is reversed by reversing the direction of the control current. Both Y-junction and T-junction circulator configurations are shown.

6 Claims, 2 Drawing Sheets

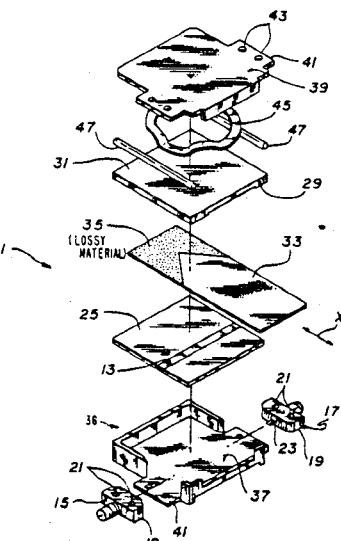


Microwave Attenuator

Inventors: Charles P. Andrikian and James K. Shimizu.
Assignee: Hughes Aircraft Company.
Filed: Aug. 10, 1987.

Abstract—A high-performance, low-cost variable attenuator is disclosed with minimal size and weight requirements. The variable microwave attenuator of the present invention includes a microwave stripline transmission line connecting the input and the output thereof; first and second ground planes are disposed on opposite sides of the transmission line; and a dielectric card having a metallization pattern is disposed on at least a portion thereof. The card is adapted for variable interposition between the transmission line and the first ground plane to provide variable attenuation of microwave energy. A specific teaching of the invention relates to the design of the metallization pattern to provide vernier attenuation.

9 Claims, 2 Drawing Sheets



4,777,457

Oct. 11, 1988

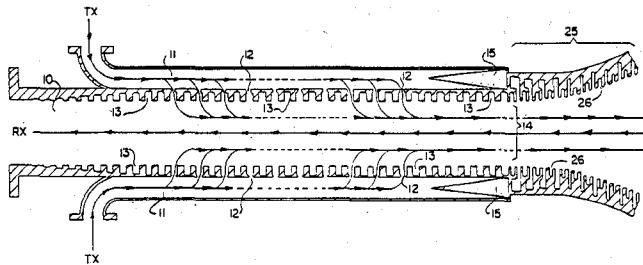
Directional Coupler for Separation of Signals in Two Frequency Bands While Preserving Their Polarization Characteristics

Inventors: Subir Ghosh and Aluizio Prata, Jr.
Assignee: Telecommunicacoes Brasileiras S/A- Telebras.
Filed: July 27, 1987.

Abstract—A directional coupler is provided which has an appropriately dimensioned principle waveguide with a frequency dependent reactive boundary interior surface such that the principle waveguide is suitable to simultaneously: (i) support, without depolarization, effective propagation of first signals in a high frequency band at a HE11 mode with greater concentration of energy near the axis of the principle waveguide than near the interior surface and no effective propagation of first signals at any unwanted mode, and (ii) support, without depolarization, effective propagation of second signals in a lower frequency band at EH11 mode having a greater concentration of energy near the interior surface of the principle waveguide than near the axis and no effective propagation of second signals at any unwanted mode. Four identical secondary waveguides are placed symmetrically at equal radial intervals about

the outside perimeter of the principle waveguide with the longitudinal axis of each of the secondary waveguides running parallel to the longitudinal axis of the principle waveguide. A plurality of coupling units are disposed at longitudinal intervals along the principle waveguide with each coupling unit comprising four aperture-like structures interconnecting a respective one of the secondary waveguides and the principle waveguide for exchanging energy in the first signals between the secondary waveguides and the principle waveguide. This structure provides a directional coupler for separation of signals in the first and second frequency bands while preserving their polarization characteristics.

15 Claims, 5 Drawing Sheets



4,777,459

Oct. 11, 1988

Microwave Multiplexer with Multimode Filter

Inventor: Thomas Hudspeth.

Assignee: Hughes Aircraft Company.

Filed: June 8, 1987.

Abstract—A microwave multiplexer has a set of independently tuneable signal channels coupled to a common waveguide. Each of the channels has input and output 3 dB couplers which are joined by cylindrical radiators carrying circularly polarized waves. Both TE and TM waves are propagated within a plurality of resonant cavities within each of the filters. Coupling between the cavities is provided by an array of slots and an array of probes wherein the slots couple TE waves and the probes couple TM waves. Adjustment of the slots and the probes provides for independent coupling coefficients for the two propagation modes. A set of coaxial line probe structures connect between the input and output couplers to end cavities of a filter for the launching of TM waves, there being discs in the end cavities adjacent the probes for converting energy of a TM wave to a TE wave, thereby providing both the TM and the TE wave propagation. There results a greater versatility in the coupling allowing for greater compaction of signal channel with reduced weight and bulk to the multiplexer.

20 Claims, 2 Drawing Sheets

4,777,458

Oct. 11, 1988

Thin-Film Power Coupler

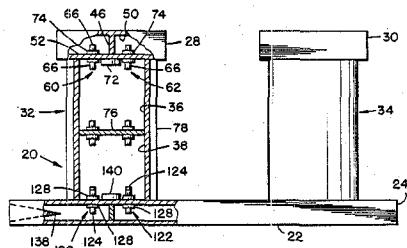
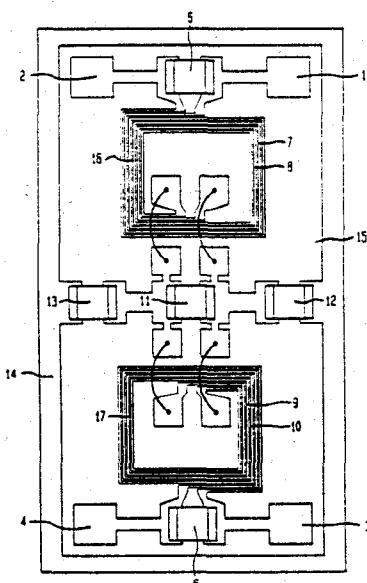
Inventor: Rossano Pardini.

Assignee: GTE Telecommunicazioni S.p.A.

Filed: Mar. 31, 1986.

Abstract—A thin-film power coupler, in particular, a 3 dB and 90 degree power divider, is fabricated of lumped circuit elements. The main characteristics of the coupler is in having achieved the coupled inductances by mutual induction. Such an achievement has been obtained with 2 microstrip lines facing each other and wrapped in a square shaped spiral. Another important characteristic of the power coupler is the presence of a capacitor in the circuit which joins the two branches of the coupler, with sufficient tolerance to obtain the wanted coupling and to recover possible tolerances incurred by manufacturing the thin-film inductors.

14 Claims, 2 Drawing Sheets



4,779,064

Oct. 18, 1988

Radio Frequency Coaxial Cable

Inventor: George J. Monser.

Assignee: Raytheon Company.

Filed: Apr. 1, 1987.

Abstract—A coaxial cable for coupling radio frequency (RF) signals therethrough with a predetermined, nominal attenuation comprising a center conductor selected to maintain the attenuation of the coaxial cable at substantially the nominal attenuation substantially independently of the frequency of the RF signals over a predetermined frequency range, such as from 2 to 18 GHz. In a preferred embodiment of the invention, the center conductor is selected having a nominal volume resistivity (ρ) and a nominal permeability (μ), with the volume resistivity-permeability product thereof substantially varying inversely with changes in frequency of RF signals coupled through the cable. With such arrangement, a lossy coaxial cable providing substantially constant attenuation over a broad range of frequencies, such as greater than three octaves, is provided having reduced size, complexity and VSWR from conventional lossy cable assemblies comprising a conventional coaxial cable coupled in series with an attenuator. Also, the frequency response attenuation characteristics of the coaxial cable are readily and consistently reproducible.

tric resonator (2), typically positioned within a housing (8), is excited by an RF input (30). The dielectric resonator (2) generates in response to the excitation first and second orthogonal modes of RF electromagnetic energy at slightly different frequencies. The two orthogonal modes are converted to dc output signals (39, 40) of opposite polarity and substantially the same magnitude, e.g., by diodes (35, 36). Frequency offsets are obtained by tuning screws (43, 44) and/or by changing the amount of dielectric (2) in the path of the characterizing vector corresponding to the mode being frequency-offset.

8 Claims, 2 Drawing Sheets

