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.

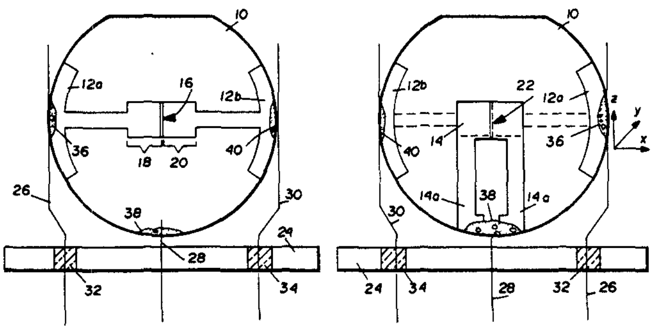
4,839,618 June 13, 1989

Monolithic Crystal Filter with Wide Bandwidth and Method of Making Same

Inventors: Gerald E. Roberts, A. Gordon Staples, and Samuel Toliver.
Assignee: General Electric Company.
Filed: May 26, 1987.

Abstract—A monolithic coupled-dual resonator crystal filter is produced for operation with wide bandwidths (especially at high center frequencies) by providing an ultrasmall gap between juxtaposed resonator electrodes. A gap width of substantially less than 0.006 inch is obtained by laser-machine trimming the gap. An initial single electrode may thus be divided into a pair of such juxtaposed resonator electrodes. Further metallic plateback is provided on the electrodes for center-frequency control. Although this typically may decrease the coupling bandwidth somewhat, an increased thickness of metallic plate-back material on the ground electrode, opposite the ultra-thin gap area on the active side of the crystal wafer, provides precisely controlled extra wide bandwidth.

12 Claims, 3 Drawing Sheets



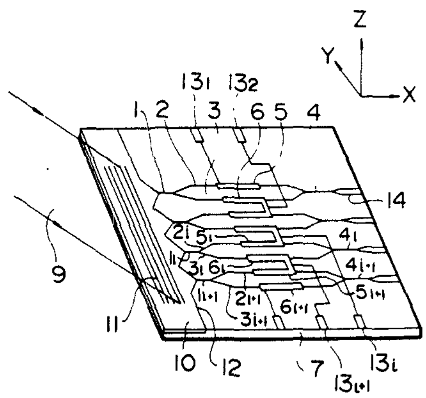
4,840,447 June 20, 1989

Light Modulating Device Array

Inventor: Keiji Kataoka.
Assignee: Hitachi, Ltd.
Filed: Sept. 10, 1987.

Abstract—A light modulating device array formed in a surface of a crystal plate with an electro-optic effect includes an optical input coupling waveguide portion receiving a laser beam from a laser source, a tapered waveguide array portion for dividing a light beam from the optical input coupling waveguide portion into a plurality of parts, and a plurality of light modulating parts juxtaposed in a predetermined direction and receiving light beams from the tapered waveguide array portion. Each of the light modulating parts includes an input waveguide portion and a pair of modulating waveguide portions formed by bifurcating the input waveguide portion, so as to form a Mach–Zehnder type waveguide structure. Further, each light modulating part includes electrodes for controlling the modulating waveguide portions, to vary the intensity of light outputted from the light modulating part, in accordance with a voltage applied to each electrode. Selected ones of the electrodes includes in this array are connected to each other, to prevent adjacent light modulating parts from interacting on each other.

10 Claims, 5 Drawing Sheets



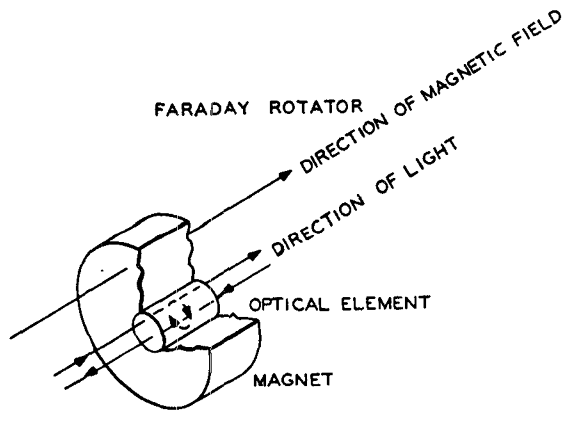
4,840,464 June 20, 1989

Optical Isolator Employing a Germanium–Arsenic–Selenium Composition

Inventor: Donald K. Wilson.
Filed: Mar. 28, 1988.

Abstract—A Faraday rotator for rotating a plane of polarization of polarized light, said Faraday rotator having an optical element comprising a rod which is comprised of an optically transmitting composition comprising from about 15 wt% to about 50 wt% germanium, from about 5 wt% to about 20 wt% arsenic, and from about 30 wt% to about 80 wt% selenium. This Faraday rotator is especially useful in an optical isolator for preventing feedback of transmitted light waves.

13 Claims, 1 Drawing Sheet



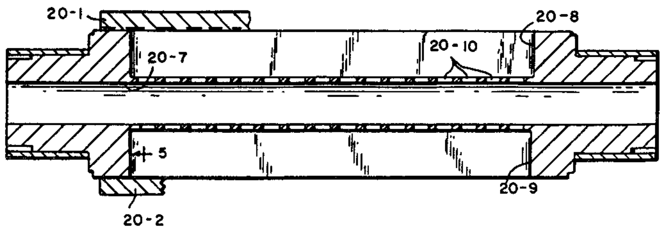
4,841,260 June 20, 1989

Half Wave Plate

Inventor: William F. Call.
Assignee: Epsco, Incorporated.
Filed: Jan. 14, 1987.

Abstract—A microwave device including a half wave plate for a microwave power combiner, attenuator or variable coupler divider having a circular waveguide portion and a pair of cavities disposed opposite to one another and each coupled to a plurality of slots formed in a wall between said cavities and said circular waveguide. The half wave plate is used to obtain a phase shift in the signals provided to one end of the circular waveguide and is preferably mounted for rotary motion about the center axis of the circular waveguide.

2 Claims, 1 Drawing Sheet



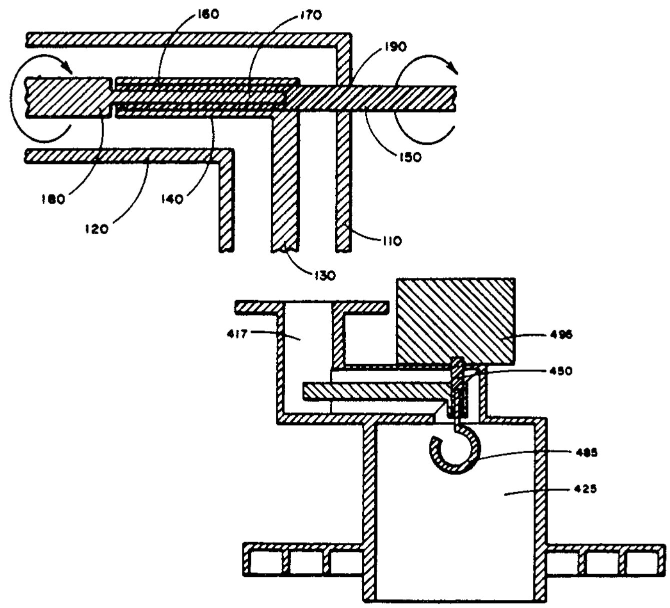
4,841,261 June 20, 1989

Microwave Rotary Junction with External Rotary Energy Coupling

Inventor: Eugene P. Augustin.
Filed: Sept. 1, 1987.

Abstract—This invention is a rotatable transmission line junction with an external rotary mechanical energy coupling it finds application in microwave polarization rotators, rotary joints, resolvers, amplitude modulators, and other devices. The rotatable conductor of the transmission line coupling is mechanically connected to devices outside of the transmission line system without electrically coupling to the outside in this manner, rotary energy and/or positional information may be input to and/or received from the coupled line. The device consists of the junction of a first transmission line and a second transmission line in which said second transmission line is coupled electrically to said first line and mechanically supported by and/or connected to a plastic rod. Said plastic rod also passes to the outside of the transmission line system to form a mechanical rotational coupling means for the coupled line. Either line may be considered to be input or output. The preferred embodiment is for the junction of said two lines at 90°, although almost any angle may be accommodated. The preferred embodiment is in the form of the junction of two coaxial transmission lines. However, other transmission line forms may be joined with the device. For example, one could join two micro strip type lines or a microstrip line and a coaxial line. These transmission lines may in turn be connected to other devices; such as waveguides, feed horns, or coaxial connectors; to make a polarization rotator, a rotary joint, resolver, amplitude modulator, or other device.

8 Claims, 3 Drawing Sheets



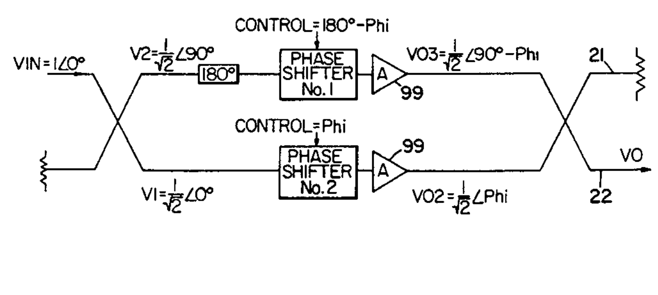
4,841,262 June 20, 1989

Radio Frequency Power Modification Without Phase Shift

Inventor: Michael Lomangino.
Assignee: United Technologies Corporation.
Filed: July 24, 1986.

Abstract—A radio frequency power and voltage modification arrangement (13) including first and second power channels (28 and 29) both electrically connected between first and second hybrid elements (15 and 16), power in said first and second hybrid elements (15, 16) being subject to respective controllable, oppositely signed phase shifts applied to said respective channels (15, 16) for modifying the power output from the arrangement (13) as a function of the cosine of the applied phase modification, without any phase modification between input and output power and voltage.

2 Claims, 2 Drawing Sheets



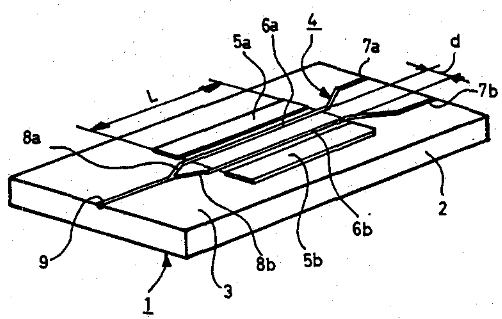
4,842,367 June 27, 1989

Optoelectronic Directional Coupler for a Bias-Free Control Signal

Inventor: Anders G. Djupsjöbacka.
Assignee: Telefonaktiebolaget L M Ericsson.
Filed: Apr. 22, 1987.

Abstract—An optoelectronic directional coupler (1) has in a coupling area two parallel, coupled lightwave conductors (6*a* and 6*b*) with a length (*L*) as well as electrodes (5*a* and 5*b*). Each of the coupled lightwave conductors has one end connected to its individual ouptut (7*a* and 7*b*) of the directional coupler (1). At their other ends the coupled lightwave conductors are each connected to its extra individual lightwave conductor (8*a* and 8*b*), the conductors (8*a* and 8*b*) being connected to the directional coupler input (9) via a fork branch. An incoming lightwave (*P*) is divided into two partial lightwaves (*P*1 and *P*2) by the extra wave conductors (8*a* and 8*b*). The partial lightwaves are in phase with each other and have the same effect in relation to each other at the inputs to the coupled lightwave conductors (6*a* and 6*b*). The partial lightwaves can be switched to either of the outputs (7*a* and 7*b*) with the aid of a control signal (*S*) connected between the electrodes (5*a* and 5*b*). The directional coupler has the advantage that the control signal (*S*) is a pure alternating voltage.

3 Claims, 4 Drawing Sheets



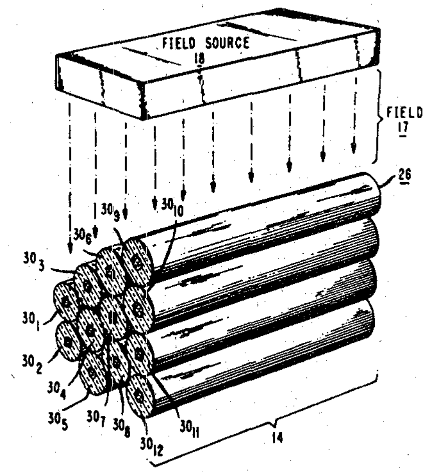
4,842,368 June 27, 1989

$N \times N$ Single-Mode Optical Waveguide Coupler

Inventors: Thomas E. Darcie and Adel A. M. Saleh.
Assignees: American Telephone and Telegraph Company; AT&T Bell Laboratories.
Filed: Aug. 17, 1987.

Abstract—The present invention relates to a $N \times N$ single-mode optical coupler employing evanescent wave coupling between mutually adjacent optical waveguides sufficiently close to one another to facilitate coupling among all the waveguides. An optical signal of a narrow frequency band, e.g. appreciably less than 100 GHz, introduced to an input port of one of the waveguides is found to be nonuniformly distributed among the output ports of the coupler. A first embodiment uses the nonuniform distributions of narrow-band optical signals to the output ports of the coupler to enable the present invention to be used as essentially a selective switching device. A second embodiment introduces one or more predetermined broad-band optical signals to one or more input ports of the coupler to produce an appreciably uniform power distribution among the output ports of the coupler. A third embodiment uses electrooptic or magneto-optic waveguides and the application of a high-frequency, continuously changing magnitude, oscillatory electric or magnetic field, respectively, throughout the coupling region of the waveguides to produce a substantially uniform power distribution among the output ports of the coupler for a narrowband optical signal applied to an input port of the coupler.

10 Claims, 2 Drawing Sheets



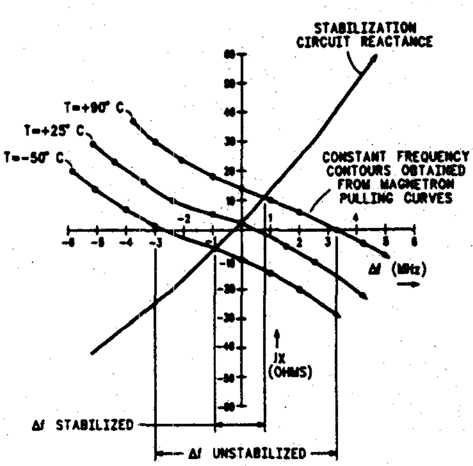
4,843,347 June 27, 1989

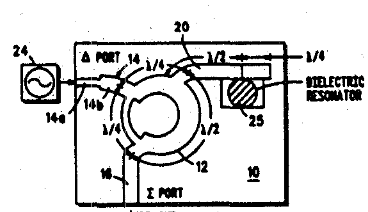
Passive Stabilizer for a Signal Generating Source

Inventors: Bernard E. Sigmon and Lawrence J. Schmacher.
Assignee: Motorola, Inc.
Filed: May 27, 1988.

Abstract—A ring stabilization circuit including a ring and three spaced apart arms, one of which has a dielectric resonator coupled thereto and acts to reflect, to the output arm, a resonant frequency supplied to the input arm. The impedance of the stabilization circuit is tailored to present to an oscillator an impedance value which over temperature, PRF, and other frequency changing perturbations, gives the oscillator the impedance required in order for the frequency drift to be minimized.

22 Claims, 2 Drawing Sheets





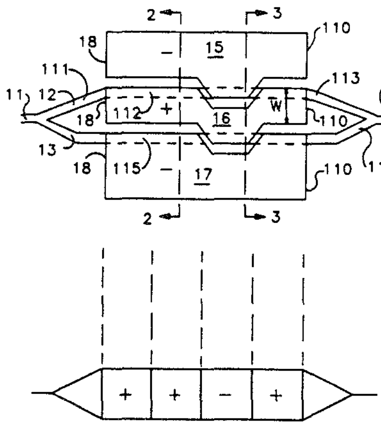
4,843,350 June 27, 1989

Coded Sequence Traveling-Wave Optical Modulator

Inventors: Moshe Nazarathy, David W. Dolfi, and Roger L. Jungerman.
Assignee: Hewlett-Packard Company.
Filed: Jan. 20, 1987.

Abstract—A traveling wave modulator in which the phase velocity of a first wave is modulated by a second traveling wave. Means are provided to alter the polarity of the second wave in accordance with a pseudorandom code. Barker codes and Golay codes are particularly suitable for improving the bandwidth-to-voltage ratio of the modulator over a comparable conventional modulator.

10 Claims, 4 Drawing Sheets



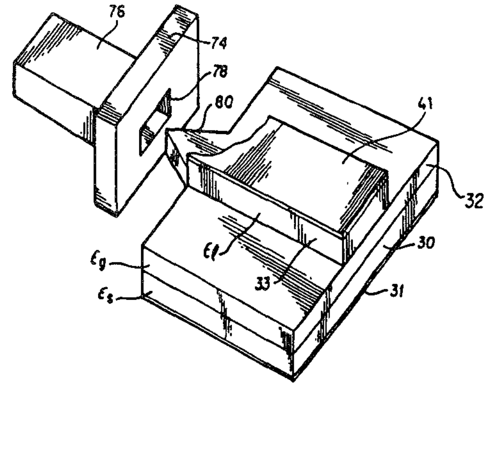
4,843,353 June 27, 1989

Dielectric Slab Transistions and Power Couplers

Inventor: Hermann B. Sequeira.
Assignee: Martin Marietta Corporation.
Filed: Nov. 27, 1985.

Abstract—A transmission line comprising a multi-layer dielectric slab structure including: a dielectric substrate layer (30) having a thickness d_s and permittivity ϵ_s; a conductive ground plane (31) on the bottom surface of the dielectric substrate layer (30); a dielectric guiding layer (32) having a thickness h and permittivity ϵ_g, where $\epsilon_g > \epsilon_s$, attached to the top surface of dielectric substrate layer (30); at least one elongated and relatively narrow dielectric loading strip layer (33) having a width W, thickness d_1, and permittivity ϵ_1, where $\epsilon_g > \epsilon_1$, attached to the top surface of the dielectric guiding layer (32); and a conductive coating (34) on the top surface of the dielectric loading strip layer (32). Such a structure permits single-mode propagation over a relatively wide frequency band. Radiation losses due to coupling of the desired mode to the substrate modes and the conductors are furthermore reduced and the polarization of the dominant mode is such as to render said structure relatively insensitive to small deviations from parallelism among the different interfaces. This invention is directed to transitions and power couplers implemented in such a multilayer dielectric slab structure.

10 Claims, 7 Drawing Sheets



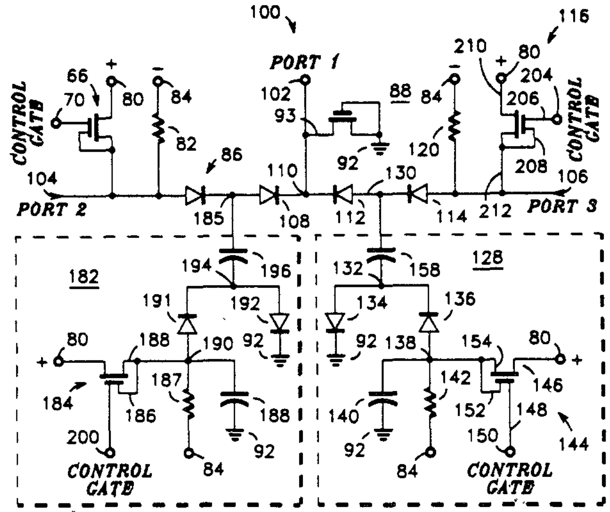
4,843,354 June 27, 1989

Broad-Band Microwave Biasing Networks Suitable for Being Provided in Monolithic Integrated Circuit Form

Inventors: Ronald D. Fuller, Richard M. Dougherty; Craig L. Fullerton, and Hugh R. Malone.
Assignee: Motorola, Inc.
Filed: Nov 18, 1988

Abstract—Inductorless bias networks include a bias circuit having a bias return path which is coupled to and biases a variable impedance device in a relatively nonconductive state. Another bias circuit including a FET renders the variable impedance device relatively conductive in response to control signals so that one port is coupled to another port, for instance.

32 Claims, 2 Drawing Sheets



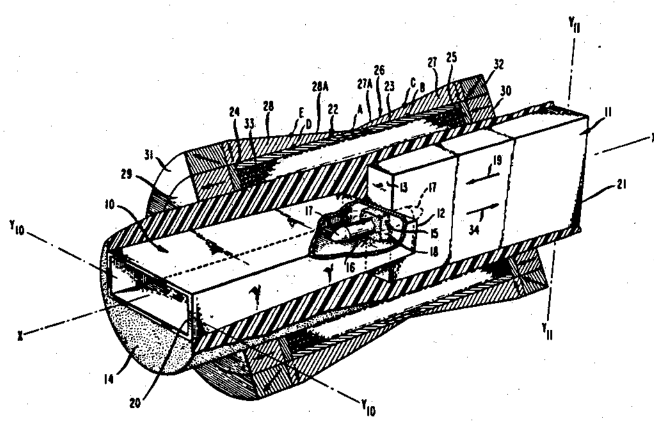
4,843,357 June 27, 1989

Tetrahedral Junction Waveguide Switch

Inventors: Richard A. Stern and Herbert A. Leupold.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Oct. 20, 1988.

Abstract—A tetrahedral junction waveguide switch is provided having two axially juxtaposed sections of hollow rectangular waveguide which are mutually cross-polarized by being rotated 90° with respect to each other. A rod of a ferrite material having gyromagnetic properties is axially disposed within the juxtaposed ends of the waveguide sections and is selectively axially magnetized to control transmission of RF electromagnetic wave energy through the sections. A permanent magnet structure having a unique cladding arrangement which minimizes flux leakage and produces a magnet of high coercive force is employed to produce a unidirectional magnetic bias field along the longitudinal axis of the rod to keep the switch in a low loss transmission state by virtue of Reggia–Spencer effect signal rotation. A selectively operable helical coil is utilized to produce another axial magnetic field which nullifies the bias magnetic field when it is desired to place the switch in a high loss or cutoff transmission state.

7 Claims, 3 Drawing Sheets



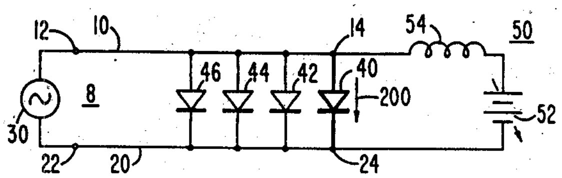
4,843,358 June 27, 1989

Electrically Positionable Short Circuits

Inventors: William H. Meise, Arye Rosen, and Paul J. Stabile.
Assignee: General Electric Company.
Filed: June 20, 1988.

Abstract—An electrical short circuit for alternating-current (ac) microwave signals is physically positionable in direct response to an electrical bias control without an intermediary electromechanical converter. The electrically positionable short circuit includes at least first and second doped regions in a semiconductor, separated by a region in which the short circuit is formed between the doped regions by the bias. A first embodiment comprises discrete diodes connected between conductors at different locations, the discrete diodes having different forward junction voltages, so that varying the common bias voltage varies the number of conducting diodes and thus positions the short circuit in a stepwise manner. A FET embodiment includes various discrete MOSFET's having different conduction threshold voltages, and having their sources and drains connected at various points to the conductors to be short-circuited, so that variations of a common gate bias voltage selectively render one or more of the FET's conductive, thereby stepwise positioning the short-circuit. Distributed p-i-n and MOSFET structures provide continuous short circuit positioning as a monotonic function of bias. Two distinct modes of operation, pinchoff/resistive and a resistive/below-threshold are possible for the distributed FET embodiment. The electrically positionable short circuit can be coupled to the conductors of a transmission line for effecting tuning, or can be coupled to a transmission line in such a way as to vary the signal path length and thereby provide phase shift.

17 Claims, 16 Drawing Sheets



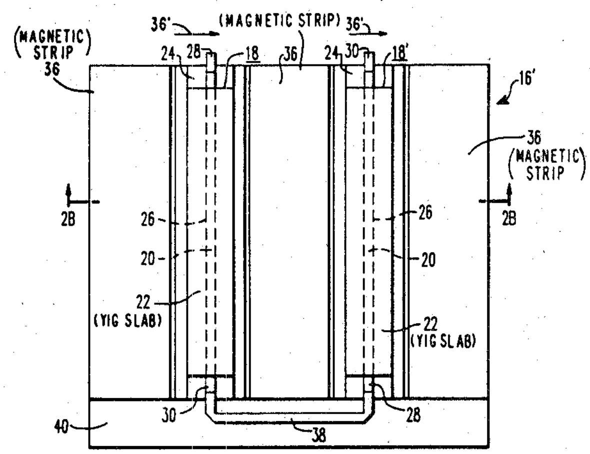
4,845,439 July 4, 1989

Frequency Selective Limiting Device

Inventors: Steven N. Stitzer, John D. Adam, and Gerald I. Klein.
Assignee: Westinghouse Electric Corp.
Filed: Mar. 18, 1988.

Abstract—A frequency selective limiting device is described incorporating a plurality of individual attenuating units spaced apart from one another in substantially parallel relation and positioned between a pair of ground planes. Each individual attenuating unit is interposed between a pair of magnetic strips. In one embodiment of the invention, each individual attenuating unit includes a microstrip conductor positioned between a dielectric substrate layer and a layer of ferrite material. In an alternate embodiment of the invention, each individual attenuating unit includes a microstrip conductor positioned between a pair of planar ferrite members, the pair of ferrite members and microstrip conductor being mechanically supported by a dielectrical substrate layer. In both embodiments of the invention, adjacent attenuating units are serially connected by microstrip jumpers to provide a flow path for microwave signals passed through the limiting device. The plurality of ferrite members in association with the plurality of magnetic strips are operable to attenuate by a predetermined level a microwave signal above a preselected threshold power level passed through the limiting device.

20 Claims, 5 Drawing Sheets



4,845,440 July 4, 1989

Distributed Amplifier Circuits

Inventor: Colin S. Aitchison.
Assignee: National Research Development Corporation.
Filed: Mar. 28, 1988.

Abstract—A wide-band amplifier for operation at very high frequencies, for example in the 20 MHz to 50 GHz range comprises a MESFET distributed amplifier (22) having a gate and a drain transmission line, a first hybrid circuit (18) to apply a first and second input signal to opposite ends of the gate transmission line, and a second hybrid circuit (26) connected to opposite ends of the drain transmission line to receive and combine first and second output signals from the drain transmission line to provide an amplified output signal. The use of two input signals traveling in opposite directions along the gate transmission line increases the gain which can be achieved in the distributed amplifier and reduces the noise component of the output signal. It is particularly useful for enhancing the performance of a distributed amplifier containing only a few MESFET's.

22 Claims, 4 Drawing Sheets