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.

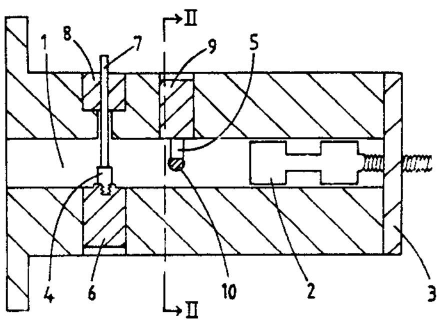
4,580,108 Apr. 1, 1986

Tunable Waveguide Oscillator

Inventor: John S. Barstow.
Assignee: U.S. Philips Corporation.
Filed: Nov 16, 1983.

Abstract—An oscillator formed in a rectangular waveguide (1) with both mechanical and electronic tuning comprises an oscillator device (4) spaced from a movable short-circuit termination (2) with a varactor diode (5) therebetween, the effective electrical spacing between the oscillator device (4) and the varactor (5) being approximately an integral number of half-wavelengths at the operating frequency. The varactor (5) extends into the waveguide (1) from one broad wall thereof and engages a transverse member (10) extending between the narrow walls so that only part of the height of the waveguide (1) at that region is obscured. This enables the operating frequency and hence the extent of coupling of the varactor (5) to the oscillator cavity, and thus the electronic tuning range, to be varied by adjusting the position of the short circuit (2). To enable the operating frequency to be mechanically adjusted without greatly influencing the electronic tuning range, and *E*-plane stub (11) with a movable short-circuit termination (12) may be branched from the waveguide (1) at the same region as the varactor (5).

10 Claims, 5 Drawing Figures



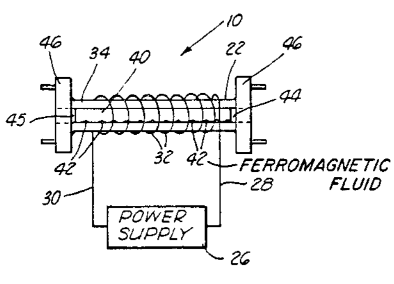
4,580,113 Apr. 1, 1986

Electrically Controlled Radio-Frequency Attenuator

Inventor: George T. Pinson.
Assignee: The Boeing Company
Filed: Apr. 16, 1984.

Abstract—An electrically controlled radio-frequency attenuator for electrically and magnetically controlling the attenuation transmitted power in a waveguide.

2 Claims, 3 Drawing Figures



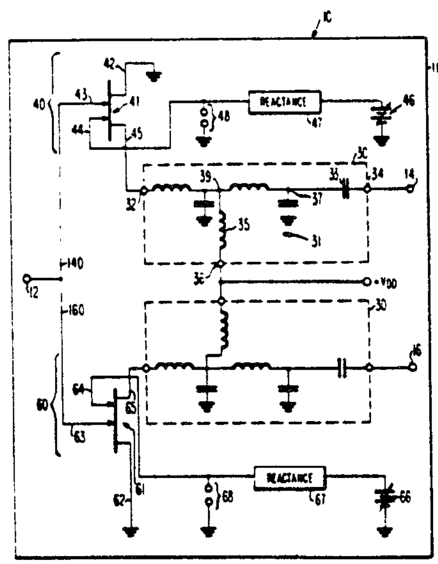
4,580,114 Apr. 1, 1986

Active-Element Microwave Power Coupler

Inventor: Lakshminarasimha C. Upadhyayula.
Assignee. RCA Corporation.
Filed: Sept. 14, 1984.

Abstract—Microwave couplers such as power splitters and combiners for coupling a common terminal to two branch terminals are disclosed which are compact and provide gain Each leg of the branching circuit comprises a dual gate FET device The dual gate FET device has its first gate connected to receive an input signal, its second gate biased and terminated in accordance with the phase shift desired from that FET device and its drain coupled to provide an output signal. Where equal phases are desired from both legs, the second gates of all of the FET devices are capacitively terminated. Where a differential phase shift is desired over the two legs, the second gate of the FET device in one leg is capacitively terminated and the second gate of the FET device in the other leg is inductively terminated. The bias voltages on the second gates are preferably selected to produce the same gain for both. Coupling the first gates of both legs to the common terminal and the drains to separate branch terminals yield a power splitter Coupling the two drains to the common terminal and the first gates to separate branch terminals yields a power combiner.

10 Claims, 5 Drawing Figures



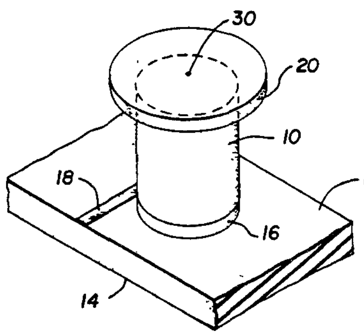
4,580,116 Apr. 1, 1986

Dielectric Resonator

Inventor: Arthur Ballato.
Assignee: The United States of America as represented by the Secretary of the Army
Filed: Feb. 11, 1985.

Abstract—A method and means for producing a zero temperature coefficient for providing frequency stabilization as well as adjusting the frequency at a particular temperature of a dielectric resonator comprised of a cylindrical dielectric resonator element mounted on a substrate and having a dielectric disc affixed to the top of the resonator element. A zero temperature coefficient is obtained by selectively choosing the thickness of the dielectric disc depending upon the temperature coefficients of the constituent material of both the disc and resonator element. The operating frequency at a given temperature is furthermore adjusted by including two mutually contiguous patterns of metallization on the top surface of the resonator element and the bottom surface of the dielectric disc and thereafter rotating the disc so that a predetermined percentage of overlap between the two patterns exists.

14 Claims, 6 Drawing Figures



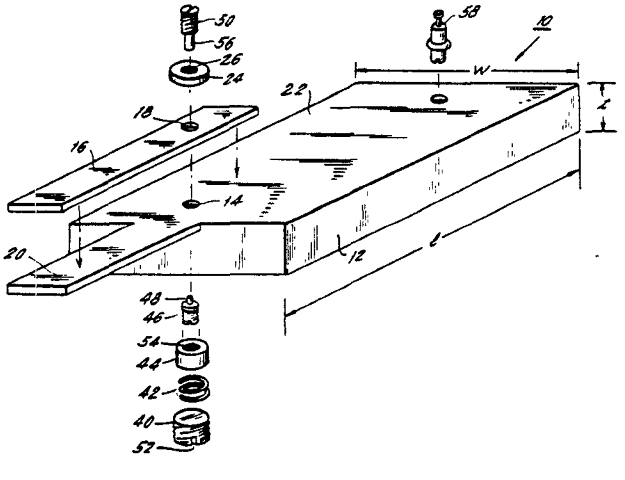
4,581,591 Apr. 8, 1986

Integrated-Circuit Tunable Cavity Oscillator

Inventors: Harold Jacobs, Robert E. Horn, and Elmer Freibergs.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Dec. 10, 1984.

Abstract —An integrated-circuit tunable cavity oscillator for extremely high frequency operation in image line waveguide. The oscillator includes a metal base with a cylindrical bore, a dielectric or semiconductor waveguide mounted atop the metal base and having a bore which is continuous with the metal base bore. A Gunn or IMPATT diode is assembled in the metal base bore on top of a drum which is urged upwards toward the waveguide bore by a spring located behind the drum. From above, cavity tuning means including a top disk and a threaded screw cover the waveguide bore and push the diode into the metal base bore to define the cavity height of the coaxial cavity of the oscillator The waveform, which is set up in the recessed cavity in the metal base, is launched into the waveguide. Thus, a ruggedized, low-cost, tunable (by a tuning screw) and low-weight oscillator for millimeter-wave image line or microstrip operation is obtained. Furthermore, the oscillator diode and cavity defining hardware are easily replaceable.

18 Claims, 5 Drawing Figures



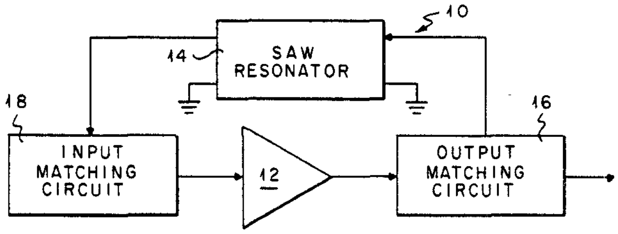
4,581,592 Apr. 8, 1986

SAW-Stabilized Oscillator with Controlled Pull-Range

Inventor: Ralph C. Bennett.
Assignee: R F Monolithics, Inc.
Filed: May 3, 1983.

Abstract —An oscillator including an active device (38), a surface-acoustic-wave resonator (40) connected in a feedback relationship to the active device and an impedance-matching circuit is disclosed. The impedance-matching circuit in one arrangement is an output impedance-matching circuit including an inductor (46) connected in the feedback loop to the output of the active device. In another arrangement, the impedance-matching network is an input impedance-matching network including an inductor (42) connected in the feedback loop to the input of the active device. In another arrangement of the invention, a varactor diode (60) is connected in the feedback loop and is controlled by a reverse voltage, which changes the capacitance of the diode, adjusting the frequency of the oscillator.

13 Claims, 4 Drawing Figures



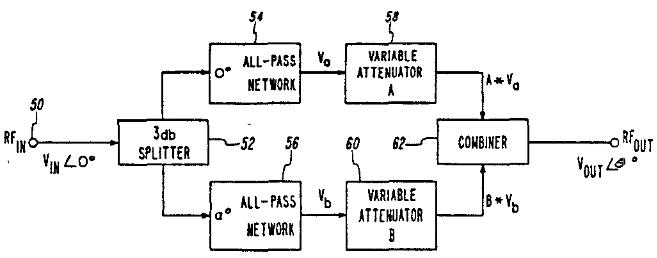
4,581,595 Apr. 8, 1986

Phase-Shift Network with Minimum-Amplitude Ripple

Inventor: Edward G. Silagi.
Assignee: Rockwell International Corporation
Filed: May 30, 1984.

Abstract —An improved phase-shift network is disclosed which is applicable to broad-band systems, particularly in connection with feedforward power amplifier systems. The phase-shift network includes a splitter for receiving an input signal and providing outputs which are coupled through all-pass networks to produce signals differing in phase by a predetermined angle. The signals from the all-pass networks are coupled through variable attenuators having their outputs recombined in a combiner to produce an output representing the input signal phase shifted by a predetermined angle. The phase shift may be adjusted by changing only one variable attenuator at a time to produce phase shifts of 90° or greater.

8 Claims, 6 Drawing Figures



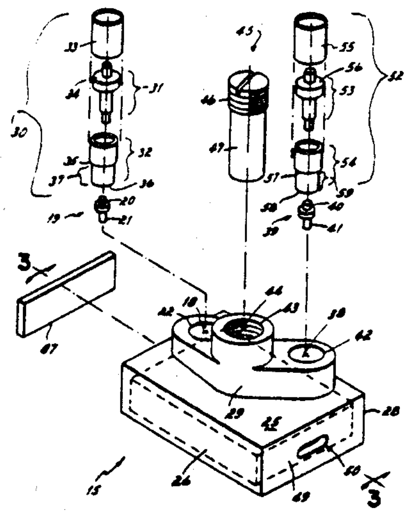
4,583,057 Apr. 15, 1986

Microwave Oscillator

Inventor: John R. Fende.
Assignee: Cincinnati Microwave, Inc.
Filed: Sept. 28, 1984.

Abstract—A box-shaped metal microwave oscillator is provided having two pairs of substantially parallel, confronting inner surfaces, the second pair perpendicular to the first pair to define an oscillator cavity. The forward end of the cavity is walled off with a slotted wall to permit only a portion of the oscillator energy to be emitted. The spacing of certain of the walls and the location of the oscillator components to the wall are described.

62 Claims, 3 Drawing Figures



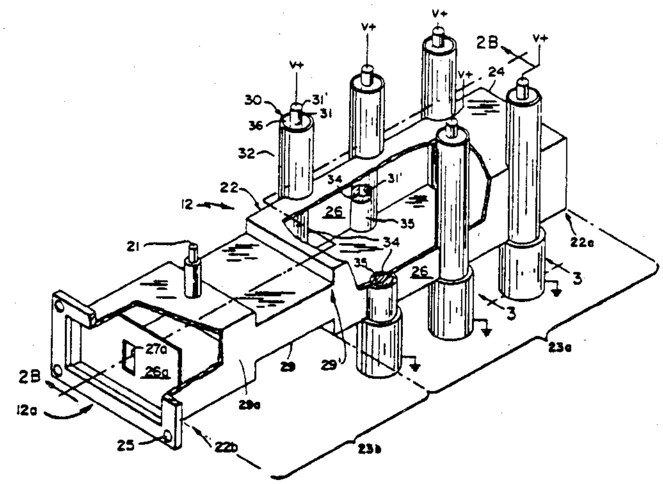
4,583,058 Apr. 15, 1986

Broad-Band Power Combiner

Inventor: James W. McClymonds.
Assignee: Raytheon Company.
Filed: Aug. 16, 1985.

Abstract—A power-combiner circuit for combining a plurality of signals to provide output power to a load over a broad range of operating frequencies includes a resonant cavity and a plurality of negative resistance diodes which couple such signals into the resonant cavity. Each one of the negative resistance diodes is disposed in a corresponding one of a like plurality of coaxial oscillators. In a first embodiment of the invention, the end of the cavity coupled to the load includes a plurality of members which provide a plurality of resonant structures and which are used to reduce variations in the impedance of the cavity over the operating range of frequency. In a second embodiment of the invention, each one of the coaxial oscillators includes a plurality of ring members used to match the impedance of the diode to that of the cavity and to reduce variations in the impedance of the cavity over the operating range of frequency. Since the impedance of the negative resistance diodes is a relatively slow changing function of frequency, reducing variations of the cavity impedance as a function of frequency provides a requisite impedance match between the diodes and the cavity over a broad range of operating frequency and, hence, provides high output power over such range of operating frequency.

11 Claims, 11 Drawing Figures



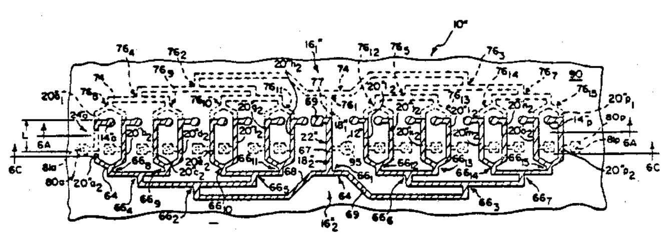
4,583,061 Apr. 15, 1986

Radio-Frequency Power Divider/Combiner Networks

Inventor: Richard L. O'Shea.
Assignee: Raytheon Company.
Filed: June 1, 1984.

Abstract—A network having a plurality of network ports includes a plurality of substantially identical independent components, each one thereof having a plurality of ports, the degree of coupling among the ports of each component being characterized by a predetermined scattering coefficient matrix. A plurality of feed networks is included, each one having: a first port corresponding to one of the plurality of network ports; and, a plurality of second ports each one being coupled to a corresponding one of the plurality of ports of each one of the plurality of components, the degree of coupling among the first port and the plurality of second ports of each of the feed networks being characterized by a predetermined scattering coefficient matrix. The plurality of feed networks and the coupling thereof to the components characterize the network with a scattering coefficient matrix, relating the coupling among the network ports, different from the scattering coefficient matrix characterizing each one of the components. The plurality of feed networks and the coupling thereof to the components provide a pair of the network ports with a degree of coupling less than the degree of coupling between the pair of component ports coupled to said pair of network ports. The network may be a reciprocal network, such as a power divider/combiner, in either waveguide or strip transmission line, or a nonreciprocal network, such as a circulator network.

4 Claims, 16 Drawing Figures



4,583,064 Apr. 15, 1986

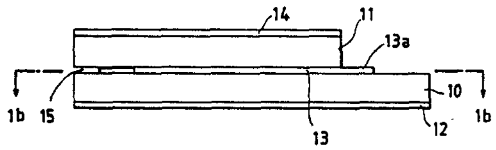
Stripline Resonator

Inventors: Mitsuo Makimoto, Morikazu Sagawa, Sadahiko Yamashita, and Yoshihiko Takayama.
Assignee: Matsushita Electric Industrial Co.
Filed: Aug. 31, 1984.

Abstract—A stripline resonator comprises a first dielectric substrate having a conductive film on one surface thereof for connection to ground and strip

line on the other surface thereof and a second dielectric substrate having one surface thereof making contact with the strip line and a conductive film on the other surface thereof for connection to ground. Fused glass having a low melting point is applied between the first and second substrates to bond them together A portion of open-circuit end of the stripline is exposed and formed with slits or gap to facilitate frequency adjustment.

20 Claims, 14 Drawing Figures



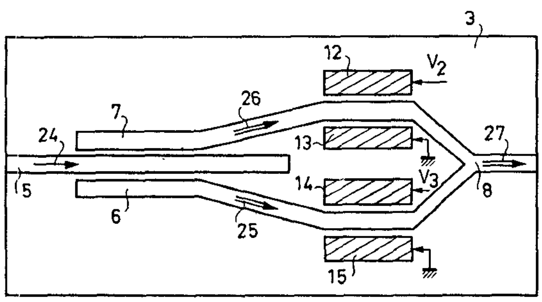
4,583,817 Apr. 22, 1986

Nonlinear Integrated Optical Coupler and Parametric Oscillator Incorporating Such a Coupler

Inventor: Michel Papuchon.
Assignee: Thomson-CSF.
Filed: Sept. 27, 1983.

Abstract—The invention relates to a coupler in which the coupling between the waveguides is carried out on the one hand, by means of evanescent waves propagating in the medium separating these guides, and on the other hand by means of a nonlinear interaction in the substrate, where the waveguides are produced. A first guide is produced by ion exchange of H^+ ions and a second guide by local titanium diffusion in the substrate.

12 Claims, 6 Drawing Figures



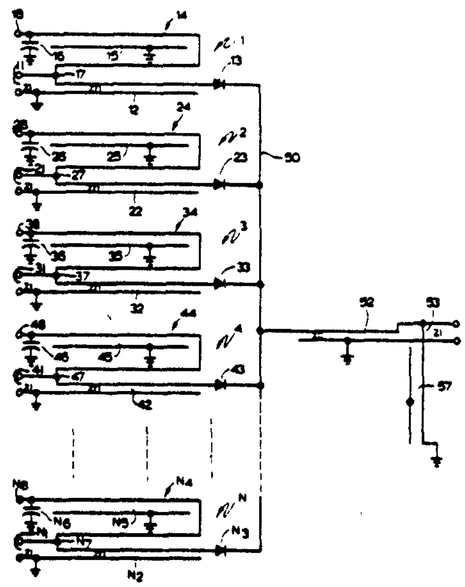
4,584,543 Apr. 22, 1986

Radio-Frequency Switching System Using p-i-n Diodes and Quarter-Wave Transformers

Inventors: Taliaferro H. Taylor, Jr., Robert T. Johnk, and Clifton W. Garvin.
Assignee: Ball Corporation.
Filed: Mar. 6, 1984.

Abstract—This invention allows the combination of any M of N signal inputs, combines the signals inputs in phase, and does not require switches to terminate unused inputs. Microstrip switching means provide an array of N quarter-wave tuners and an associated single, common, quarter-wave tuner that are interconnected by N semiconductor switching means Each of the N semiconductor switches is connected with one of the N quarter-wave tuners and is operable to provide a low impedance between its connected quarter-wave tuner and the single common quarter-wave tuner. Microstrip connecting means for the microstrip switching means forms an array of N transmission lines N associated quarter-wave transformers for semiconductor switch biasing and a single transmission line. Each of the N transmission lines and its associated one of the N bias quarter-wave transformers are connected together at one end and further connected with one of the N quarter-wave transformers of the microstrip switching means and has an RF connection at its other end. The single transmission line is connected at one end with the single common integral quarter-wave transformer of the microstrip switching means and has an RF connection at its other end. Electrical current through any M of the N bias quarter-wave tuners and the connected M quarter-wave and semiconductor switches can be used to electrically connect the M quarter-wave tuners with the single common quarter-wave tuner, permitting signals on the M quarter-wave tuners to be combined in phase of the common quarter-wave tuner output.

10 Claims, 3 Drawing Figures



4,586,009 Apr. 29, 1986

Double Staggered Ladder Circuit

Inventor: Bertram G. James.
Assignee: Varian Associates, Inc.
Filed: Aug. 9, 1985.

Abstract—A double-coupled ladder circuit for a traveling-wave tube has been a slow-wave circuit formed of a pair of combs, each cut from a single piece of metal. Transverse grooves are cut in each piece to form teeth and axial grooves are cut in the ends of the teeth. The two combs are joined at teeth ends to form a ladder with the transverse grooves aligned to form cavities and the axial grooves aligned to form a beam passageway. Coupling apertures are cut in both sides of a first set of alternating ladder rungs and a second set of apertures cut in the comb backing members over the second, interleaved, set of rungs. Thus, each cavity is coupled on two opposite sides to its preceding cavity and on the two remaining sides to its following cavity. The double coupling provides increased bandwidth and efficiency. Finally, side plates are affixed to cover the apertures, complete the cavity walls and form the vacuum envelope.

3 Claims, 4 Drawing Figures