

# Patent Abstracts

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4,700,145

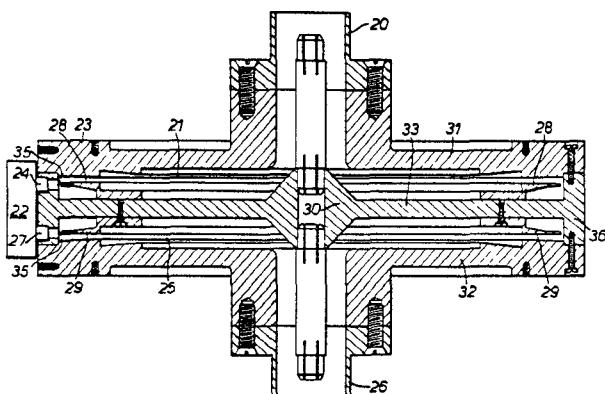
Oct. 13, 1987

## Radially Fed Microwave Signal Combiner Distributor Apparatus

Inventors: John Yelland and Alan Thompson.  
Assignee: Plessey Overseas Limited  
Filed: Mar. 21, 1985.

**Abstract**—Radially fed microwave signal combiner/distributor apparatus comprising a central coaxial connector which is coupled via radially extending paths to several circumferential coaxial connectors which are equiangularly disposed on the circumference of a circle surrounding the central connector, the apparatus including a generally discoidal microwave transmission cavity through which the paths extend, which cavity communicates at the center thereof with the central coaxial connector and which cavity communicates at the circumferential periphery thereof with the circumferential coaxial connectors via a conductive annulus, which annulus is spaced away from the internal circumferential periphery of the cavity, and to which annulus the inner conductors of the circumferential coaxial connectors are electrically connected at locations equiangularly spaced around the annulus.

4 Claims, 7 Drawing Figures



4,700,153

Oct. 13, 1987

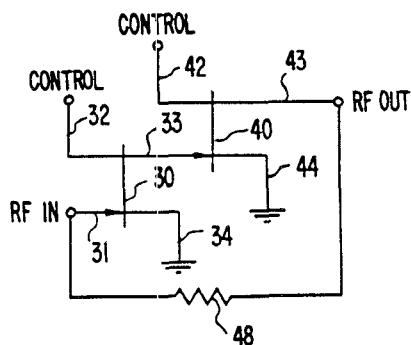
## Phase-Compensated FET Attenuator

Inventors: Seward T. Salvage, Donald K. Belcher, and Charles D. Rosier.  
Assignee: Harris Corporation.  
Filed: Jan. 13, 1986

**Abstract**—A dual gate MESFET attenuator circuit provides substantial range of attenuation without phase shift through a cascaded arrangement of a pair of dual gate MESFET's and the incorporation of a feed forward resistor. By cascading the two transistors together, the attenuation vector characteristics are effectively rotated 180° or shifted to the third and fourth quadrants of the (real/imaginary) vector plane. The resulting phase shift between the minimum attenuation vector and the maximum attenuation vector is compensated by the insertion of a pure resistance component in a feed forward fashion between the input and output terminals of the cascaded dual MESFET pair. The value of the inserted resistor is chosen so as to effectively make both

the maximum attenuation vector and the minimum attenuation vector cophasal, thereby providing a constant phase shift through the attenuator over a substantial range of attenuation.

17 Claims, 7 Drawing Figures



4,700,154

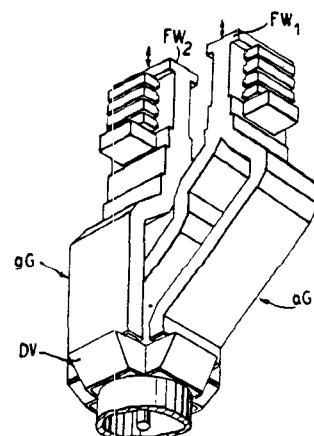
Oct. 13, 1987

## Polarization Separating Filter for Hyperfrequency Structures

Inventor: Eberhard Schuegraf.  
Filed: Mar. 26, 1986.

**Abstract**—A polarization diplexer which branches from a circular or quadratic waveguide in the axial direction into pairs of rectangular waveguides respectively lying opposite each other with the first pair of two rectangular waveguides lying opposite one another and fed by a symmetrical hybrid junction comprising straight subarms and wherein the first pair are symmetrical. The second pair of rectangular waveguides comprises two rectangular waveguides lying opposite each other which is fed by a second electrically symmetrical hybrid junction having subarms straddled over their broad dimension. The invention can also be utilized as a polarization frequency diplexer.

11 Claims, 7 Drawing Figures



4,700,158

Oct. 13, 1987

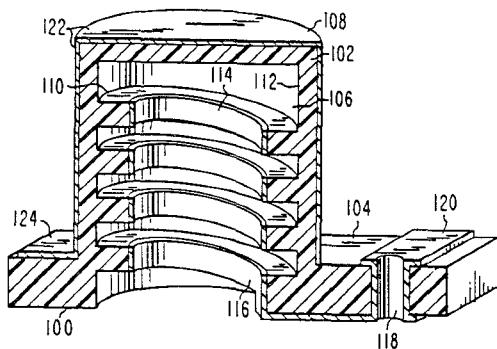
Oct 20, 1987

**Helical Resonator**

Inventor: Denis P. Dorsey.  
 Assignee: RCA Corporation  
 Filed: Sept 30, 1986.

**Abstract**—A helical resonator comprises an insulating body portion having therein a cavity. In one embodiment, a helical conductor is formed on the inside wall of the cavity and another conductor is formed on the outside of the insulating body. In another embodiment, the helical conductor is formed on the outside of the insulating body and the other conductor is formed on the outside wall of the cavity. In a preferred embodiment, the disclosed helical resonator is formed as an integral part of the body of a signal coupler for coupling an antenna to a tuner and electrically forms a series tuned trap connected between conductors of the signal coupler.

8 Claims, 7 Drawing Figures



4,700,159

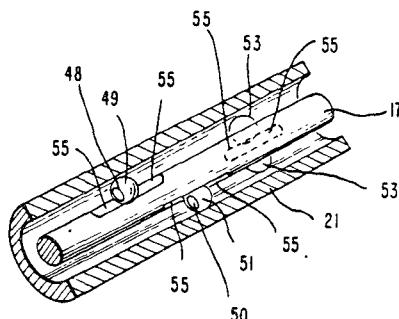
Oct. 13, 1987

**Support Structure for Coaxial Transmission Line Using Spaced Dielectric Balls**

Inventor: Earl M. Jones, III  
 Assignee: Weinschel Engineering Co., Inc.  
 Filed: Mar. 29, 1985

**Abstract**—A support structure for a coaxial transmission line includes a plurality of groups of dielectric balls compressibly mounted between the inner and outer conductors of the coaxial transmission line, the balls being “locked” into position via recesses located in the outer face of the inner conductor with holes centrally located in the balls and aligned parallel with the longitudinal axis of the transmission line sewing to compression relieve the balls and improve the VSWR of the transmission line, and with seventy-degree V-grooves being located on either side of the recesses in longitudinal alignment with the coaxial transmission line, for further improving the VSWR by adding inductance to compensate for the capacitance added by the presence of the balls.

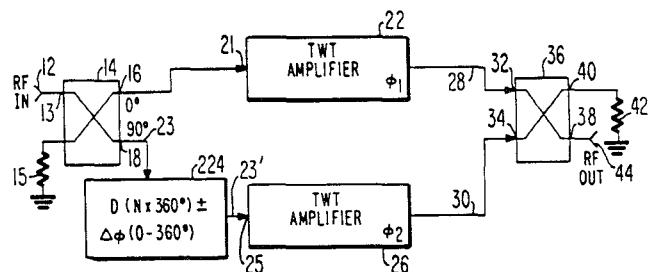
22 Claims, 17 Drawing Figures

**Parallel Distributed Signal Amplifiers**

Inventor: Joseph J. Poole.  
 Assignee: RCA Corporation  
 Filed: May 7, 1986.

**Abstract**—Two or more distributed amplifiers are paralleled to increase the available output power. Phase shifters are coupled to the amplifiers as necessary to maximize output power at a frequency. With this phase adjustment, the amplifiers may have effective electrical lengths which differ one from another by  $N (360^\circ)$ , where  $N$  is zero or an integer. Values of  $N$  other than zero undesirably reduce the instantaneous bandwidth of the paralleled amplifiers. The bandwidth is maximized by the addition of sufficient delays to reduce  $N$  to zero.

16 Claims, 7 Drawing Figures



4,701,724

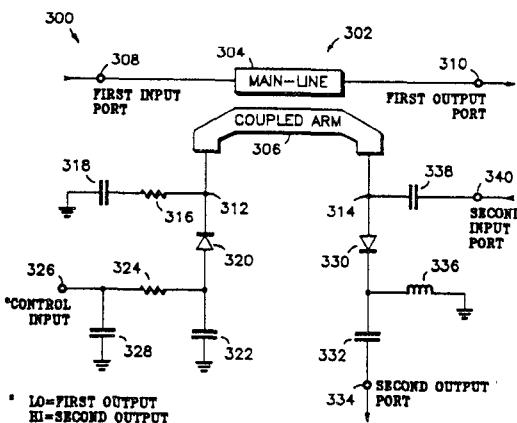
Oct. 20, 1987

**Injection Switch and Directional Coupler**

Inventor: William J. Martin.  
 Assignee: Motorola, Inc.  
 Filed: July 15, 1986.

**Abstract**—An RF switch includes a directional coupler with a main line and a quarter wavelength coupled arm. One end of the main line is connected to a first input port and the other end is connected to a first output port. The coupled arm is selectively terminated at one end in either its characteristic impedance or a short. A PIN diode controls the termination. The second end of the coupled arm is connected to a second input port. A PIN diode switch is connected between the second end of the coupled arm and a second output port. In a first position, signals present at the input ports are combined and appear at the first output port. The directional coupler provides isolation such that the signal at the second input port is not coupled to the first input port. In the second position, the signal at the second input port is disconnected from the first output port and only connected to the second output port.

8 Claims, 4 Drawing Figures



4,701,725

Oct. 20, 1987 4,701,728

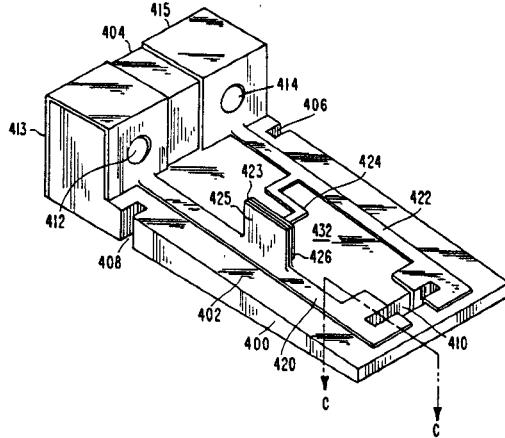
Oct. 20, 1987

## Radio Frequency Signal Coupler

Inventor: Denis P. Dorsey.  
Assignee: RCA Corporation  
Filed: May 30, 1986.

**Abstract**—A radio frequency signal coupler includes first and second conductors formed on an insulating body for coupling signals between respective input and output couplings. A series resonant circuit is formed on the insulating body between the first and second conductors for shunt attenuating interfering signals. The series resonant circuit includes a capacitance part that also functions as a protective spark gap.

## 4 Claims, 5 Drawing Figures



4,701,727

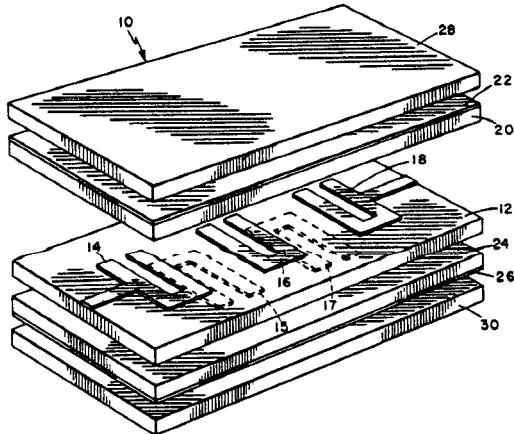
Oct. 20, 1987

## Stripline Tapped-Line Hairpin Filter

Inventor: Joseph S. Wong.  
Assignee: General Dynamics, Pomona Division.  
Filed: Nov. 28, 1984.

**Abstract**—A stripline tapped-line filter is disclosed including a first substrate upon which a plurality of  $N$  hairpin resonators are disposed alternately on opposite surfaces of the first substrate. Each one of the hairpin resonators is in a parallel coupled relationship with an adjacent hairpin resonator disposed on an opposite surface of the first substrate. The first and last hairpin resonators each have an interconnected member disposed on the substrate for respectively coupling a signal into and out of the plurality of  $N$  hairpin resonators. Second and third substrates are included with each being respectively located adjacent to ones of the plurality of  $N$  hairpin resonators on opposite surfaces of the first substrate. First and second groundplanes are included with each respectively located adjacent the second and third substrates.

## 12 Claims, 9 Drawing Figures

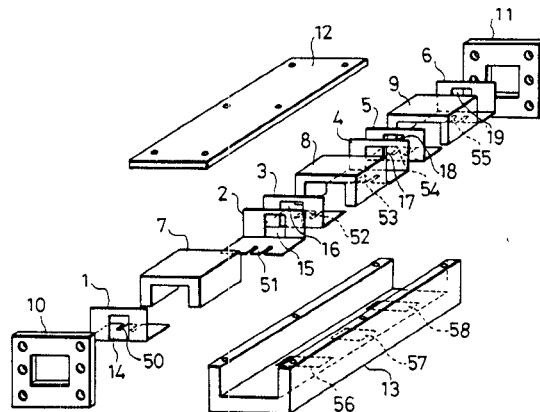


## Waveguide Filter

Inventor: Sadao Igarashi.  
Assignee: Alps Electric Co., Ltd.  
Filed: Sept. 2, 1986

**Abstract** — A waveguide filter for use in a communication system that treats microwaves or millimetric waves comprises waveguides of a U-shaped cross section and a support on which the waveguides are longitudinally connected in series. Two inductor plates bear on each of the waveguides to form a waveguide resonator. Each inductor plate has first and second planes meeting at right angles. Thus, each inductor plate assumes an L-shaped form. Each first plane covers the corresponding longitudinal U-shaped end of the waveguides. Each second plane covers half of the corresponding open bottom of the waveguides, and has a tongue formed by two notches. This tongue can be bent and inserted into the corresponding waveguide to adjust the center frequency of the passband of the bandpass filter formed by the waveguide filter.

## 4 Claims, 12 Drawing Figures



4,701,731

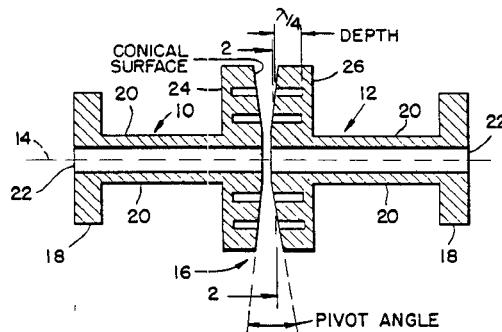
Oct 20, 1987

## Pivotal Conical Joint for Waveguides

Inventors: Allan W. Hanson and Theron L. Christiansen.  
Assignee: Hughes Aircraft Company.  
Filed: Apr 23, 1986

**Abstract**—A pivotal joint for waveguides provides a low-loss interface between two rigid waveguides at which relative movement can occur. The pivotal joint has two waveguide sections which are terminated in conical surfaces containing concentric chokes to minimize RF energy leakage. A universal gimbal is utilized to position the joints so that the pivotal motion occurs about the apices of the chokes. The advantages of this RF joint include zero bending torque, absence of a fatigue failure mode, low insertion loss and a good impedance match at all angles of operation and over large bandwidths.

## 5 Claims, 5 Drawing Figures



4,701,732

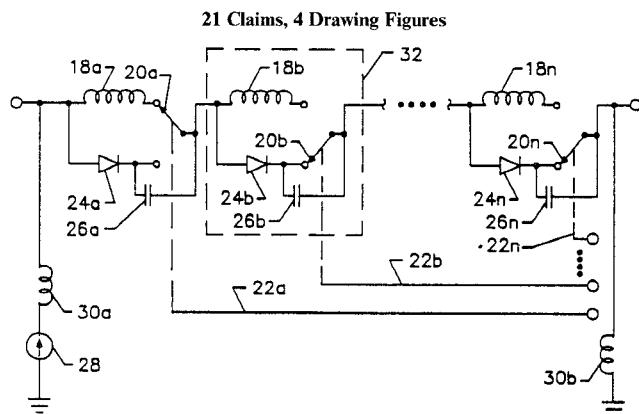
Oct. 20, 1987 4,703,289

Oct. 27, 1987

**Fast Tuning RF Network Inductor**

Inventor: C. Dale Nestlerode.  
 Assignee: Hughes Aircraft Company.  
 Filed: Dec 16, 1986

**Abstract** — A variable inductor usable in a fast tuning RF network comprises a plurality of inductor switching circuits connected in series. Each inductor switching circuit includes an input terminal connected to a discrete inductor and to a PIN diode, and includes an output terminal connected to switches which are in turn connected to the parallel connected discrete inductor and PIN diode. The PIN diode operates in either the forward bias mode for switching out the respective discrete inductor, or in the reverse bias mode for switching in the respective discrete inductor. The PIN diode is forward or reverse biased by MOSFET switches one of which has a parasitic capacitor used to provide a charged rectified reverse bias voltage to the PIN diode to insure reverse bias operation during large voltage changes in the conducted RF signals. The MOSFET switches are controlled by logic signals so that rapid switching by computer or other processor control is possible. Electrical isolation of the logic control circuitry is provided by optically coupling the control signals to the MOSFET switches.



4,703,286

Oct. 27, 1987

4,703,291

Oct. 27, 1987

**Dual Gate Tunable Oscillator**

Inventor: Max W. Muterspaugh.  
 Assignee: RCA Corporation.  
 Filed: Nov. 26, 1986.

**Abstract** — A dual gate field effect transistor (FET) is configured as a self-buffering local oscillator of a tuner by arranging the FET in a cascode configuration in which the first gate electrode is coupled to the source electrode through an oscillation conditioning network and also to a frequency determining network, the second gate electrode is coupled to signal ground through a negligible impedance and the drain electrode is utilized as the output of the oscillator.

11 Claims, 5 Drawing Figures

