# Patent Abstracts

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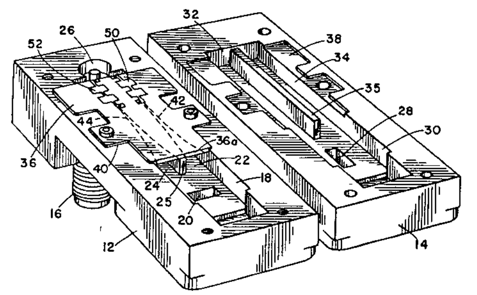
**4,480,336** Oct. 30, 1984

## Orthogonal Hybrid Finline Mixer

Inventors: Joseph S. Wong, Kuo-Ing Chung, and Kenneth A. Rudenauer.
Assignee: General Dynamics, Pomona Division.
Filed: Sept. 20, 1982.

*Abstract*—A *Ka*-band orthogonal hybrid finline mixer includes a two-piece housing forming an orthogonal hybrid-T junction having a finline mounted within the waveguide *E*-plane at the output of the orthogonal hybrid-T junction with one-half of the finline substrate mounted within the top waveguide housing and the other half inserted within the bottom waveguide housing.

**10 Claims, 9 Drawing Figures**



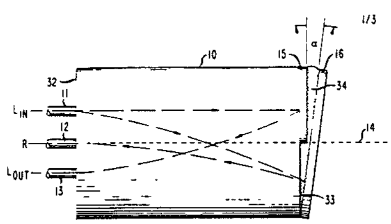

**4,486,071** Dec. 4, 1984

## Optical Coupling Device

Inventor: Frank H. Levinson.
Assignee: AT & T Bell Laboratories.
Filed: July 7, 1982

*Abstract*—An optical coupling device for diverting light among different transmission elements. A plurality of transmission elements (11,12,13) are coupled to one surface (32) of a focusing element (10). Positioned near the opposite surface (32) are first and second at least partially reflecting elements (15 and 16). The first element (15) may be affixed to the end surface of the focusing element and covers only a portion thereof. The second element is positioned further from the end surface and at an angle to the first element. The area of the first element is chosen to produce a desired splitting ratio, and the angle between elements can be adjusted to maximize coupling efficiency between the transmission elements. The device can be used, for example, as a three port coupler, an asymmetric four port coupler, or a four port power divider.

**17 Claims, 11 Drawing Figures**



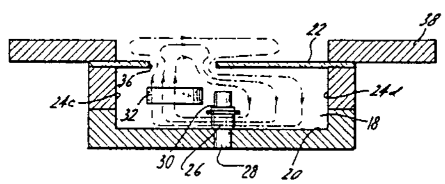

**4,488,124** Dec. 11, 1984

## Resonant Cavity with Dielectric Resonator for Frequency Stabilization

Inventor: Yoshikazu Yoshimura.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Sept. 4, 1981.

*Abstract*—A frequency stabilized oscillator includes a rectangular resonant cavity having a ground of short circuit wall, an H wall, and a top wall having an inductive window therein. A solid-state oscillating device such as a GUNN diode is attached at one end thereof to the short circuit wall, and a disk type dielectric resonator is supported from the short circuit wall and is located substantially adjacent the solid-state oscillating device so as to electromagnetically couple with the oscillating device. The inductive window is located so as to be in substantially overlying relationship with the dielectric resonator. A strip conductor is attached to the upper end of the oscillating device and extends through the H wall to the exterior of the oscillator to thereby provide a dc supply terminal for the oscillating device. The H wall of the resonant cavity is located from the dc supply applied to the strip conductor by means of a thin insulating layer between the strip conductor and the H wall. The capacitance formed between the strip conductor and the H wall is increased by increasing the width of the strip conductor at portions thereof which pass through the H wall. Thereby, the oscillator energy effectively passes directly through the strip conductor and the insulating layer back to the resonant cavity, while at the same time, preventing the dc supply applied to the oscillating device from being applied to the H wall.

**5 Claims, 9 Drawing Figures**



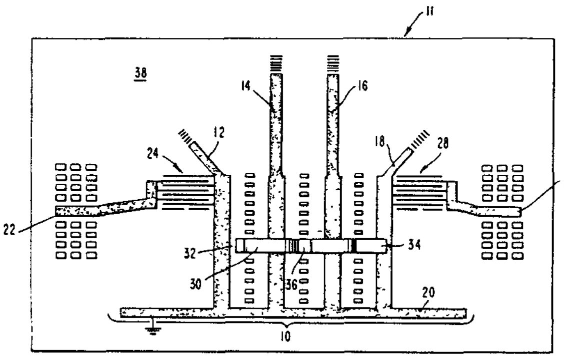

**4,488,130** Dec. 11, 1984

## Microwave Integrated-Circuit Bandpass Filter

Inventors: Frederick A. Young, Robert J. Ahulii, and Roy K. Rikimaru
Assignee: Hughes Aircraft Company.
Filed: Feb. 24, 1983.

*Abstract*—The present invention provides an improved microwave integrated circuit filter for electromagnetic waves. The filter includes a waveguide and three, four or more resonators spaced from one another and extending from the waveguide. Means, which may include a conductive ribbon, are provided electromagnetically coupling nonadjacent resonators.

**4 Claims, 2 Drawing Figures**



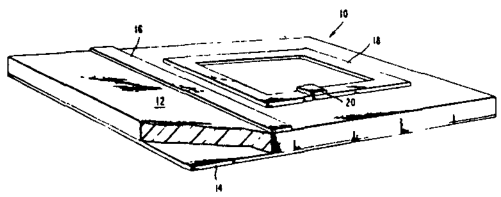

## 4,488,131 Dec. 11, 1984

## MIC Dual-Mode Ring Resonator Filter

Inventors: Edward L. Griffin, Harvey M. Endler, and Frederick A. Young.
Assignee: Hughes Aircraft Company.
Filed: Feb. 25, 1983.

*Abstract*—An electromagnetic filter assembly comprises a transmission line electromagnetically coupled to a dual mode resonator having a means for differentially tuning the two modes. The filter may be incorporated in a microwave integrated circuit, and the tuning means may be a movable dielectric slab asymmetrically disposed on the resonator.

**4 Claims, 2 Drawing Figures**



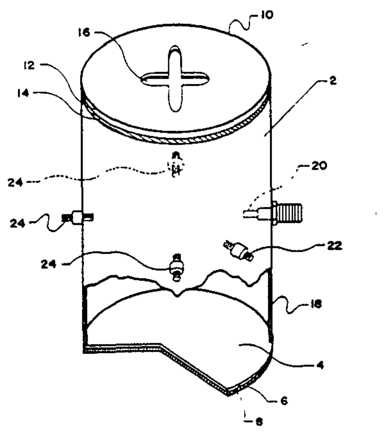

## 4,488,132 Dec. 11, 1984

## Temperature-Compensated Resonant Cavity

Inventors: Adrian V. Collins and Patrick M. Naraine.
Assignee: Com Dev Ltd.
Filed: Dec. 13, 1982.

*Abstract*—A resonant microwave cavity 2 has a bi-metal end cap 4 or a tri-metal end cap 26. The end caps 4, 26 include irises 10, 28. The end caps are affixed to walls of the cavity 2 in the usual manner As temperature varies, the end caps or irises expand into or out of the cavity to compensate for the increase or decrease in length of the cavity walls due to variations in temperature. The internal volume of the cavity is maintained substantially constant. When a bi-metal end cap is used, each layer of metal has a different coefficient of expansion. When a tri-metal end cap is used, the center layer has the highest of coefficient of thermal expansion.

**18 Claims, 14 Drawing Figures**



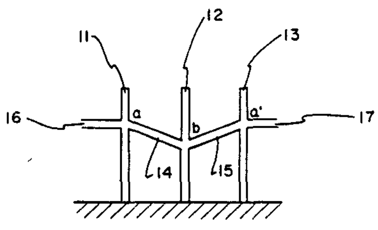

## 4,489,292 Dec. 18, 1984

## Stub-Type Bandpass Filter

Inventor: Hiroshi Ogawa.
Assignee: Nippon Electric Co., Ltd.
Filed: Jan. 10, 1983.

*Abstract*—A bandpass filter has a line extending from an input terminal to an output terminal. Three stubs are connected to the line at three different locations on the line at a spacing which is $\frac{1}{4}$ of the wavelength, at the center frequency of the passband. Each of the three stubs is short-circuited at a first end and open at a second end and has a total length which is $\frac{1}{4}$ the wavelength of said center frequency. The outermost of the three stubs is connected to the transmission line, at a position which is 1/6 of the wavelength, from the first end. The intermediate of the three stubs is connected to the line at a position which is either $\frac{1}{8}$ or $\frac{1}{4}$ the wavelength of the center frequency.

**11 Claims, 8 Drawing Figures**



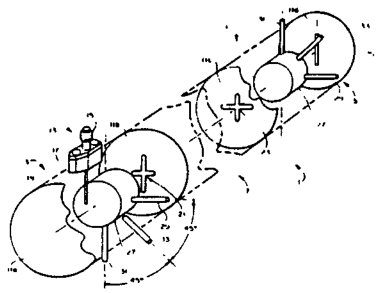

## 4,489,293 Dec. 18, 1984

## Miniature Dual-Mode Dielectric-Loaded Cavity Filter

Inventor: Slawomir J. Fiedziuszko.
Assignee: Ford Aerospace & Communications Corporation.
Filed: Feb. 14, 1983.

*Abstract*—A ceramic resonator element having high $Q$, high dielectric constant, and a low temperature coefficient of resonant frequency is enclosed within a cavity to form a composite microwave resonator having reduced dimensions and weight as compared to a simple cavity resonator. A pair of tuning screws extend into the cavity along orthogonal axes to tune the structure to resonance along these axes at frequencies near the fundamental resonance of the ceramic element. Several such cavities can be formed in a short length of waveguide by the use of transverse partitions at spaced intervals and coupling between cavities can be accomplished by using simple slot, cross or circular irises. In each cavity, a mode-perturbing screw is positioned along an axis 45° from each of the orthogonal tuning screws, such that resonance along either of the orthogonal axes is coupled to excite resonance also along the other. The realization of complex filter functions requiring cross couplings is feasible by means of coupling separately to only one of the two orthogonal resonant modes in the cavities.

**14 Claims, 4 Drawing Figures**



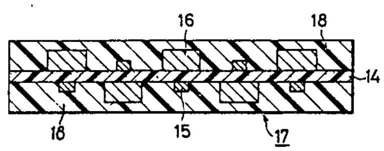
**4,490,690** Dec. 25, 1984

## Stripline Cable

Inventor: Hirosuki Suzuki.
Assignee: Junkosha Company, Ltd.
Filed: Apr. 22, 1982.

*Abstract*—A stripline cable is provided comprising a dielectric layer and a plurality of sets of narrow signal conductors and wider ground conductors which are disposed in confronting relation to each other with the dielectric layer sandwiched therebetween. The signal and ground conductors are alternately arranged transversely of the conductors. The dielectric layer is preferably made of porous polytetraflouroethylene resin. With this arrangement, crosstalk in the stripline can be greatly reduced and signals can be transmitted at higher speeds over the stripline.

**6 Claims, 4 Drawing Figures**



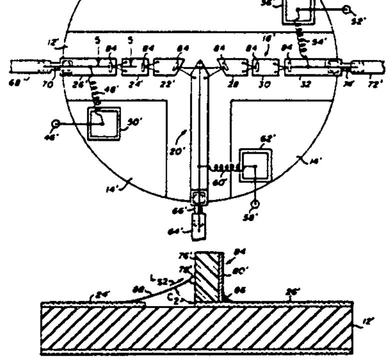

**4,490,694** Dec. 25, 1984

## Microwave Switch Wherein p-i-n Diode is Mounted Orthogonal to Microstrip Substrate

Inventor: James L. Godbout.
Assignee: Eaton Corporation.
Filed: July 28, 1982.

*Abstract*—An improved microwave multithrow switch incorporating pin diodes wherein the pin diodes are mounted orthogonally to the conductivity stripline.

**7 Claims, 6 Drawing Figures**



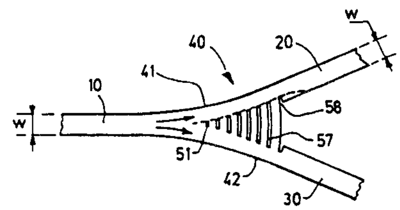
**4,490,695** Dec. 25, 1984

## Wideband Power Adder–Divider for High-Frequency Circuits and Impedance Transformer Realized on the Basis of the Adder–Divider

Inventor: Frans C. de Ronde.
Assignee: U.S. Philips Corporation.
Filed: Mar. 4, 1983.

*Abstract*—A wideband power adder-divider for high-frequency circuits including a first conductive transmission line (10) for passing a high-frequency current, second and third conductive transmission lines (20) and (30) over which this high-frequency current is distributed, and a conductive wedge-shaped transition section (40) joining the first to the second and third lines. This section has two arc-shaped outer edges (41) and (42) which are tangentially connected at one end of the section to the first line and at the other end to the second and third lines. The section includes parallel slots extending transversely to the direction of propagation of the current. The parallel slots (51) to (58) have ends which are separated from the arc-shaped edges by a distance which is less than the width of the second and third transmission lines.

**7 Claims, 3 Drawing Figures**




**4,490,696** Dec. 25, 1984

## Crossed Waveguide-Type Polarization Separator

Inventors: Fumio Takeda, Osami Ishida, and Yoji Isoda.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Dec. 9, 1981.

*Abstract*—A crossed waveguide-type polarization separator comprises a crossed waveguide for propagating orthogonal linear polarized waves, at least one conductor septum fitted in the crossed waveguide to totally reflect only one polarized wave in the linear polarized waves, at least one subwaveguide for receiving one linear polarized wave formed by the total reflection of the conductor septum, and a waveguide for receiving the other linear polarized wave which is not reflected by the conductor septum.

**3 Claims, 5 Drawing Figures**