Patent Abstracts

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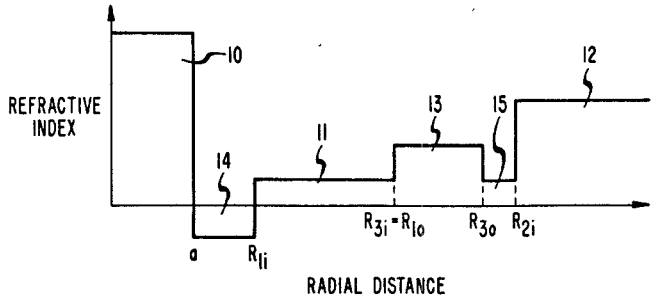
4,641,917

Single-Mode Optical Fiber

Inventors: Paul F. Glodis and Terrence A. Lenhan.
Assignee: AT&T Bell Laboratories.
Filed: Feb. 8, 1985.

Abstract—A single-mode optical fiber comprises a core, a first cladding surrounding the core, and a second cladding surrounding the first cladding. It also comprises a third cladding region (or index "ring"). The core, has radius a and refractive index n_c, the first, second, and third cladding regions have inner radii, R_{1i}, R_{2i}, and R_{3i}, outer radii R_{1o}, R_{2o}, and R_{3o}, and indices n_1, n_2, n_3 respectively. The fiber has $n_1 < n_3$, $R_{1o} \leq R_{3i}$, $R_{3o} \leq R_{2i}$. In preferred embodiments, $a = R_{1i}$, $R_{1o} = R_{3i}$, $R_{3o} = R_{2i}$. Appropriate choice of ring parameters can result in a lowering of the cut-off wavelength of the fiber, or in fiber that is less sensitive to macrobending than similar prior art fiber lacking an index ring, without substantial change in fiber parameters that depend primarily on the waveform in the core. An optical fiber communications system comprising the inventive fiber is also disclosed.

20 Claims, 6 Drawing Figures



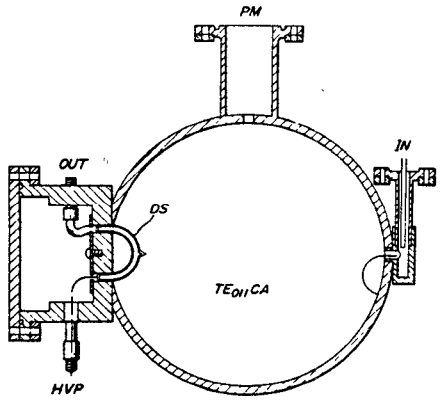
4,642,571 Feb. 10, 1987

Microwave Pulse Source

Inventors: Kazuo Minami and Mitsuru Awano.
Assignee: Tokyo Institute of Technology.
Filed: July 10, 1985.

Abstract—A superconducting cavity has a long time constant when the coupling factor of its output port is low so as to accumulate input microwave energy therein, and after a certain accumulation of the input microwave, an output microwave pulse with a large power is extracted from the cavity by suddenly increasing the coupling factor of its output port.

5 Claims, 13 Drawing Figures



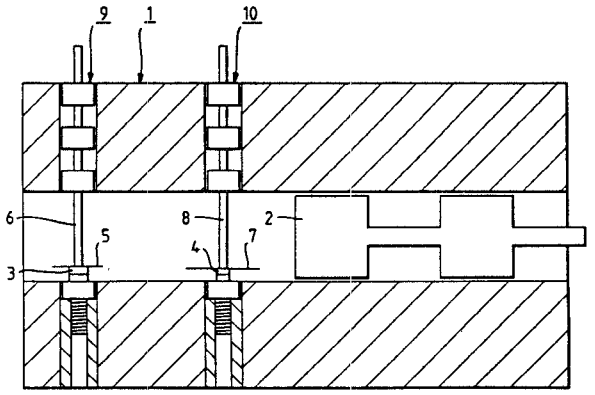
4,642,577 Feb. 10, 1987

Injection-Locked Waveguide Oscillator

Inventor: Robert N. Bates.
Assignee: U.S. Philips Corporation.
Filed: Mar. 10, 1986.

Abstract—An injection-locked waveguide oscillator comprises a first diode (3) having a free-running fundamental frequency above the local cutoff frequency of the waveguide (1) and a second diode (4) having a fundamental frequency below and a higher harmonic above the local cutoff ferequency. The first diode (3) may be an IMPATT diode and the second diode (4) a Gunn diode. The free-running fundamental frequency of the first diode (3) is close to the higher harmonic of the second diode (4) so that the second diode (4) injection-locks the first (3). Locking in the reverse sense is inhibited by the inherent loss in conversion from the higher harmonic to the fundamental in the second diode (4), thus avoiding the need for a circulator or isolator. The two diodes (3, 4) preferably are mounted in a common waveguide (1) for a simple compact structure.

6 Claims, 1 Drawing Figure



4,642,578 Feb. 10, 1987

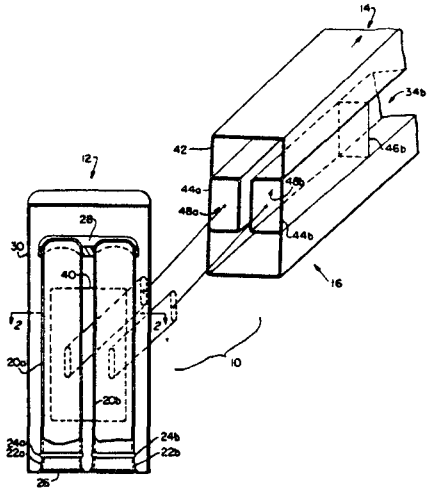
Push-Pull Radio Frequency Circuit with Integral Transition to Waveguide Output

Inventor: Wilfred P. Bennett.
Filed: Feb. 26, 1986.

Abstract—A radio frequency circuit for ICRF heating includes a resonant push-pull circuit, a double ridged rectangular waveguide, and a coupling transition which joins the waveguide to the resonant circuit. The resonant circuit includes two cylindrical conductors mounted side by side and two power vacuum tubes attached to respective ends of a cyindrical conductor. A conductive yoke is located at the other end of the cylindrical conductors to short circuit the two cylindrical conductors. The coupling transition includes two relatively flat rectangular conductors extending perpendicular to the longitudinal axes of a respective cylindrical conductor to which the flat conductor is attached intermediate the ends thereof. Conductive side covers and end covers are also provided for

forming pockets in the waveguide into which the flat conductors extend when the waveguide is attached to a shielding enclosure surrounding the resonant circuit.

5 Claims, 2 Drawing Figures



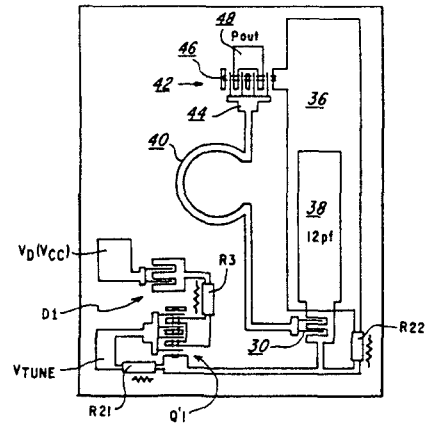
4,642,580 Feb. 10, 1987

Stabilized Microwave Varactor

Inventor: Bentley N. Scott.
Assignee: Texas Instruments Incorporated.
Filed: Aug. 1, 1985.

Abstract—A microwave varactor network wherein parametric oscillation modes are suppressed by coupling the varactor, with very low intervening impedance, to a bias regulator circuit (preferably an emitter follower circuit) through which the varactor bias voltage is supplied. The emitter follower is biased to always be carrying current, which improves its response time in compensating any transient bias voltage variations which appear across the varactor.

30 Claims, 6 Drawing Figures



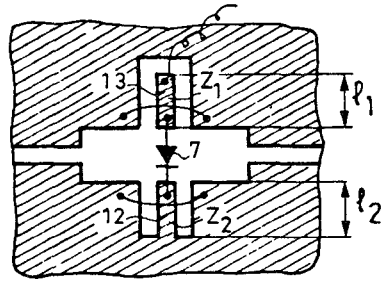
4,642,584 Feb. 10, 1987

Slot-Line Switching and Limiting Device for Operation at Microwave Frequencies

Inventors: Ronald Funck and Jean Stévance.
Assignee: Thomson-CSF.
Filed: Jan. 31, 1985.

Abstract—A slot-line for a microwave device in which is mounted at least one diode connected in parallel between two metallic strips of the slot. At high frequencies (18 to 200 GHz), the inductance L of the diode connections presents a not-negligible impedance which makes it difficult to use the diode. The device in accordance with the invention comprises a slot-line reentrant circuit which provides compensation for the diode inductance and is constituted by a metallic section which is coplanar with the line and connected in series with the diode. The compensating section is short-circuited or open-circuited with respect to the metalic strip in which it is reentrant. The electrical length of the compensating section is adjustable by means of wire, conductive varnish or metal pads.

7 Claims, 12 Drawing Figures



4,642,585 Feb. 10, 1987

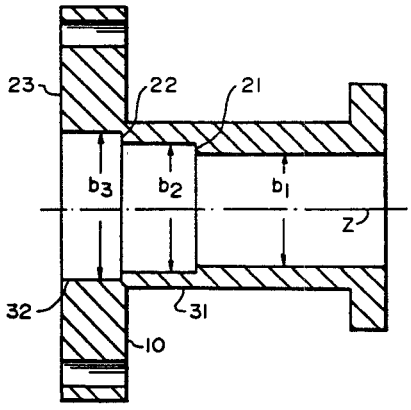
Superelliptical Waveguide Connection

Inventor: Saad M. Saad.
Assignee: Andrew Corporation.
Filed: Jan. 30, 1985.

Abstract—A waveguide connection comprising the combination of a rectangular waveguide, an elliptical waveguide having a cutoff frequency and impedance different from those of said rectangular waveguide, an inhomogeneous stepped transformer joining said rectangular waveguide to said elliptical waveguide, said transformer having multiple sections all of which have inside dimensions small enough to cutoff the first excitable higher order mode in a preselected frequency band, each section of said transformer having a transverse cross section defined by the equation: $(2x/a)^p+(2y/b)^p=1$, where a is the dimension of the inside surface of said cross section along the major transverse axis, b is the dimension of the inside surface of said cross section along the minor transverse axis, and x and y define the location of each point on the inner surface of the cross section with reference to the coordinate system established by the major and minor transverse axes of the cross section, respectively, the value of said exponent p increasing progressively from the section adjacent to said elliptical waveguide to the section adjacent to said rectangular waveguide, and the magnitudes of a and b changing progressively

from step to step along the length of said transformer so that both the cutoff frequency and the impedence of said transformer change monotonically along the length of said transformer.

5 Claims, 7 Drawing Figures



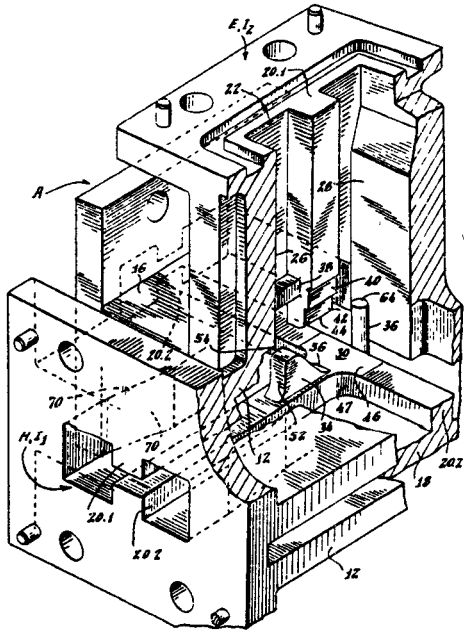
4,642,586 Feb. 10, 1987

Low-SWR High-Power Multiple Waveguide Junction

Inventor: Wayne D. Fowler.
Assignee: Adams-Russell.
Filed: Apr. 20, 1984.

Abstract—A multiple waveguide junction such as a magic T is described capable of coupling large average and peak powers with a low standing wave ratio over a wide bandwith. The magic T structure employs waveguide arms which meet at a common junction region and has a plane of symmetry that bisects both the E and H input waveguide arms. The latter arms each have necked down segments so as to improve the bandwidth of the structure. Impedance matching elements are employed in the junction region. One element has a ridge-like shape selected to provide an impedance match to the H input waveguide arm. Other matching elements are employed to provide a low SWR over a bandwidth that approaches a 3:1 ratio.

24 Claims, 9 Drawing Figures



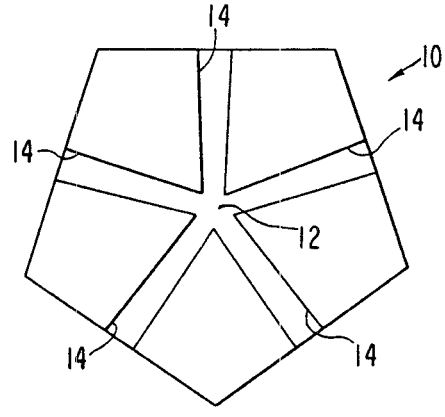
4,642,587 Feb. 10, 1987

Tapered Five-Port Waveguide Star Junction

Inventors: Majid Riaziati and George A. Zdasiuk.
Assignee: Varian Associates, Inc.
Filed: May 29, 1985.

Abstract—A matched lossless reciprocal five-port junction can be constructed as a tapered five-fold symmetric star. The dimensions of the leads are tapered in toward the center, such that the cutoff frequency is the upper band frequency divided by 1.66.

2 Claims, 3 Drawing Figures



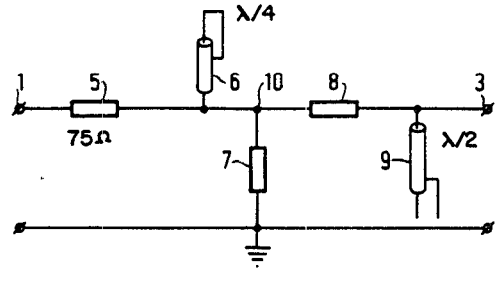
4,642,590 Feb. 10, 1987

Frequency Multiplier Having Open and Short-Circuited Lines Resonating a Multiplied Output Frequency

Inventor: Johannes H. Buijs.
Assignee: U.S. Philips Corporation.
Filed: May 10, 1985.

Abstract—Multipliers for high frequencies having an input and an output. The input is connected via a terminating impedance to the input of a short-circuited transmission line having a length $\lambda/4$, where λ is the wavelength of the desired output frequency. The input of the short-circuited transmission line is connected to a point of constant potential via a first impedance and also to the output via a second impedance which is much higher than the terminating impedance. The output is connected to the input of an open-ended transmission line having a length $\lambda/2$.

3 Claims, 4 Drawing Figures



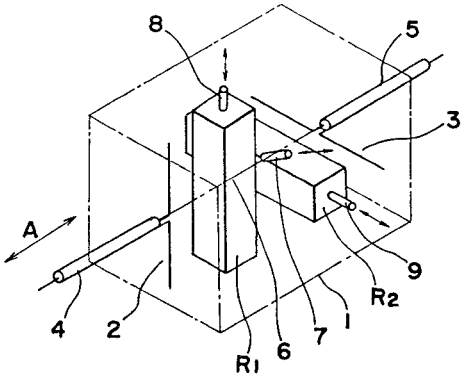
4,642,591 Feb. 10, 1987

TM-Mode Dielectric Resonance Apparatus

Inventor: Yoshio Kobayashi.
Assignee: Murata Manufacturing Co , Ltd.
Filed: Aug. 30, 1985.

Abstract—A dielectric resonance apparatus for resonating in a TM mode such as TM 110 or the like The apparatus includes a case having therein at least two TM-mode dielectric resonators, these resonators being oriented in the case so that their magnetic fields intersect each other. The apparatus also comprises means for coupling the magnetic fields. The TM-mode dielectric resonators may be integrally or separately formed. Each adjacent pair of resonators may be magnetically interconnected by an irregularly shaped portion of the case, such as a depressed portion or a projecting portion, for influencing the respective magnetic fields of each resonator by a selected degree, such that different respective degrees of influence are obtained with respect to the even and odd modes to be produced by the two resonators. The apparatus may include a third dielectric resonator which is closer to the second resonator than to the first resonator, the first and the third resonators being magnetically connected to provide polarized band-pass characteristics. The respective lengths of the first and second resonators may be made different so as to change the degree of magnetic connection between the first and third resonators

21 Claims, 33 Drawing Figures



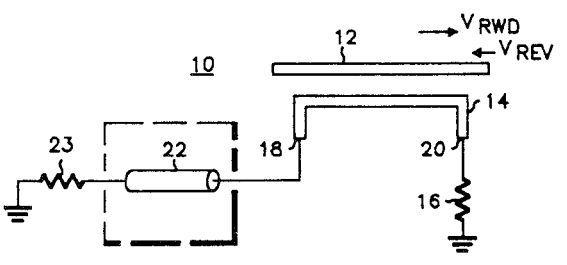
4,644,260 Feb. 17, 1987

Coupler with Coupled Line Used to Cancel Finite Directivity

Inventor: Philip C. Warder.
Assignee. Motorola, Inc.
Filed· Aug. 5, 1985

Abstract—A directional coupler is disclosed comprising either a stripline or microstrip transmission line coupler apparatus serially coupled to an error correcting circuitry which is designed to minimize the standing wave in the coupled line Elimination of the standing wave in coupled line results in a directional coupler of better accuracy. The error correcting circuitry uses an impedance mismatch of a preselected magnitude and phase angle which are determined by varying the same at a particular frequency until the standing wave of the coupled line is minimized. In the preferred embodiment, a length of coaxial cable is used.

4 Claims, 5 Drawing Figures



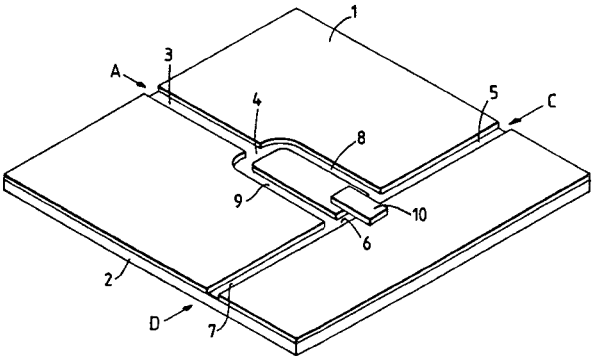
4,644,302 Feb. 17, 1987

Microwave Power Divider

Inventors: Ian R Harris and Ewan W. Shepherd.
Assignee: Ferranti, plc.
Filed: Jan. 29, 1986.

Abstract—A divider is made from a layer (1) of conducting material carried on an insulating support (2). A first slotline (3) is formed in the conducting layer extending from a first input port (A). A second slotline (5,6,7) is formed at right-angles to and spaced from the end of the first slotline (3), extending between first and second output ports (C and D). Third and fourth slotlines (8,9) extend from the end of the first slotline (3) to points on the second slotline spaced by a distance which is elecrically short compared with one-quarter of a wavelength. The third and fourth slotlines (8, 9) are an odd multiple of quarter-wavelengths long. A resistor (10) is connected across the second slotline substantially midway between the ends of the third and fourth slotlines, and has a resistance such that the output ports are correctly terminated.

3 Claims, 4 Drawing Figures



4,644,305 Feb. 17, 1987

Odd-Order Elliptic Waveguide Cavity Filters

Inventors: Wai-Cheung Tang, Joseph Frenna, and David Siu.
Assignee: Com Dev. Ltd.
Filed: Dec. 3, 1985.

Abstract—An odd-order bandpass filter has at least one cavity resonating at its resonant frequency in three independent orthogonal modes. The filter has at least one feedback coupling that is made to resonate and change sign at a center frequency. When the filter has two cavities, one being a triple cavity and the other being a dual mode cavity, the filter can be operated to achieve an elliptic function response Also, the filter of the present invention can achieve a weight and volume reduction when compared to six-pole dual mode filters.

29 Claims, 13 Drawing Figures