References

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[2] V. K. Tripathi and C. L. Chang, "Quasi-TEM parameters of non-symmetrical coupled microstrip lines," *Int. J. Electronics*, vol. 45, pp. 215–223, Aug. 1978.

[3] V. K. Tripathi, "Asymmetric coupled transmission lines in an inhomogeneous medium," *IEEE Trans. Microwave Theory Tech.*, vol MTT-23, pp. 734–739, Sept. 1975.

[4] V. K. Tripathi, "Equivalent circuits and characteristics of inhomogeneous nonsymmetrical coupled line two port circuits," *IEEE Trans. Microwave Theory Tech.*, vol MTT-25, pp. 140–142, Feb. 1977.

[5] W. J. Getsinger, "Dispersion of parallel coupled microstrip," *IEEE Trans. Microwave Theory Tech.*, vol. MTT-21, pp. 144–145, Mar. 1973.

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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, DC 20231.

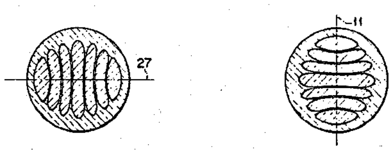
4,400,055 Aug. 23, 1983

Optical Power Distributor and Method for Manufacturing the Same

Inventors: Takeshi Ozeki, Shigeru Ohshima.
Assignee: Tokyo Shibaura Denki Kabushiki Kaisha.
Filed: Mar. 29, 1982.

Abstract—A pair of optical fibers are arranged parallel in contact. A portion of the pair is thermally fused to form a biconical taper waist. The biconical taper waist is cleaved at its thinnest portion, thus dividing the pair of optical fibers into two sections each having a tapered portion at one end. One of the sections is rotated by 90°, and its tapered portion is butted on the tapered portion of the other section, while keeping the axes of both sections aligned. The tapered portions thus butted are then thermally fused to couple the sections together, thus providing an optical power distributor. At the thinnest portion of the waist, one of the cores of one section overlaps both cores of the other section.

7 Claims, 12 Drawing Figures



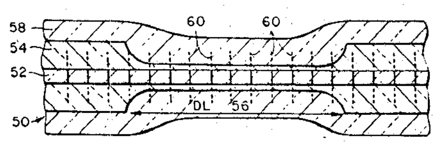
4,400,056 Aug. 23, 1983

Evanescent-Wave Fiber Reflector

Inventor: Paolo G. Cielo.
Assignee: Her Majesty the Queen as represented by the Minister of National Defence of her Majesty's Canadian Government.
Filed: Mar. 17, 1981.

Abstract—A tunable optical fiber reflector is described, together with a method of making the same. A length of optical fiber has a core of a first light transmitting material, and a cladding of a second light transmitting material covering the core. The cladding is etched away to a predetermined thickness over a portion of the fiber. A layer of photoresist material is applied either to the etched away portion of the fiber or to a thin metal blade, i.e., mask, and then exposed to beams of light which optically interfere and generate a standing wave pattern in said material. The photoresist material is then developed to fix said wave pattern therein. An optical discontinuity is formed in one of the core and cladding by that fixed wave pattern, said discontinuity representing a quasi-periodical fluctuation in the refractive index and causing evanescent waves in the cladding to be reflected. Such discontinuity forms a distributed-feedback reflector. In one method, the fiber core in the etched portion is bombarded under a vacuum with a beam of ions passed through openings having said standing wave pattern, thus producing quasi-periodical fluctuations in the refractive index of the core. More preferably, the photoresist material is coated on the etched portion of the fiber, and counter-propagating light beams are coupled into opposite ends of the fiber. These beams expose the photoresist material and generate the standing wave pattern therein as residual quantities of the same. The etched portion of fiber is typically filled with reinforcing material such as an epoxy. Two such reflectors in an optical fiber make up a resonator, and several resonators can be used in a hydrophone line-array.

5 Claims, 5 Drawing Figures



4,400,669 Aug. 23, 1983

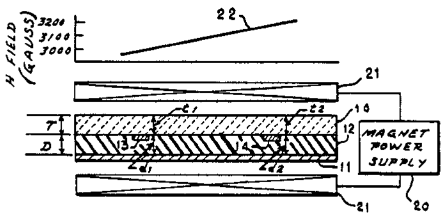
Magnetostatic Wave Delay Line Having Improved Group Delay Linearity

Inventors: Michael R. Daniel, John D. Adam, Robert A. Moore.
Assignee: The United States of America as represented by the Secretary of the Air Force.
Filed: Sept. 25, 1981.

Abstract—The linearity of group delay versus frequency in magnetostatic wave delay lines is improved by a linear variation of one of three discrete parameters in the region between the two delay line transducers. The parameter variation is applied to magnetostatic wave delay lines that have a ground

plane, a magnetic garnet crystal film substrate that is spaced from the ground plane and has transmitting and receiving transducers engaged to it, and a magnetic bias field. The discrete parameters varied are the magnetic bias field; the distance of the substrate from the ground plane; and the thickness of the substrate. Appropriate linear variations of any one of the these parameters provides improved linearity of group delay versus frequency.

8 Claims, 9 Drawing Figures



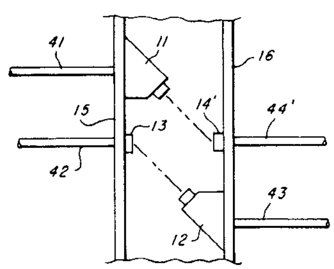
4,401,360 Aug. 30, 1983

Optical Slip Ring

Inventors: George L. Streckmann, Jerry W. Yancy.
Assignee: Texas Instruments Incorporated.
Filed: Aug. 4, 1980.

Abstract—An optical slip ring provides optical communication between a pair of member free to rotate with respect to each other. These members may be a pair of optical fibers, an electrical conductor and an optical fiber or a pair of electrical conductors. One member is attached to a first mounting device and the other member is attached to a second mounting device. One optical receiver is positioned in the center of the first mounting device on a common axis of rotation with respect to the second mounting device. The other optical receiver is mounted on the second mounting device, positioned on the common axis of rotation One optical emitter is mounted off center on the first mounting device and the other optical emitter is mounted off center on the second mounting device. The optical emitter mounted on the first mounting device is aimed at the optical receiver mounted on the second mounting device, and the optical emitter mounted on the second mounting device is aimed at the optical receiver mounted on the first optical device. Relative rotation between the members does not change the optical communication between the optical emitters and their respective optical receivers.

25 Claims, 7 Drawing Figures



4,401,365 Aug. 30, 1983

Rotary-Type Optical Switch

Inventors: Sadao Mizokawa, Yoshiji Ito, Yasuo Hosoda, Hiroshi Kaita, Tadaaki Okada, Hiroaki Ohnishi, Seiichi Yasumoto, Hitoshi Fushimi, Jushi Ide, Hiroshi Kuwahara.
Assignee: Hitachi, Ltd.
Filed: Feb. 6, 1981.

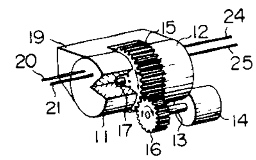
Abstract—Disclosed is an optical switch of the rotary-type in which a pair of opposing optical transmission path mounting members are disposed on the same axis.

A plurality of junction faces of optical transmission paths disposed on the respective opposing plane portions of the mounting members along phantom circles which are opposite to each other and concentric with the pair of mounting members respectively with respect to the axis so that the junction faces on the respective plane portions are capable of being correspondingly opposite to each other.

When the pair of the mounting members are relatively rotated about the axis, the facing mates of the opposing junction faces of the optical transmission paths are changed over to switch the optical transmission paths.

In the case where an optical path relay member is interposed between the pair of the optical transmission path mounting members, the optical transmission paths can be switched by only the rotation of the optical path relay member.

2 Claims, 26 Drawing Figures



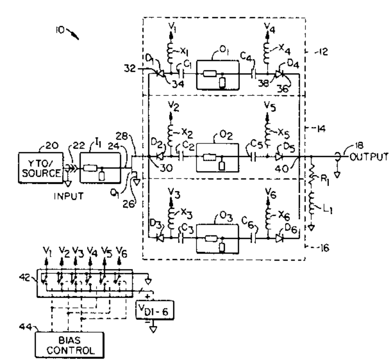
4,401,952 Aug. 30, 1983

Microwave Switched Amplifier Multiplier

Inventor: Ganesh R. Basawapatna.
Assignee: Microsource, Inc.
Filed: July 20, 1981.

Abstract—A solid-state microwave signal amplifying and multiplying apparatus capable of substantially continuous tuning over an extended frequency range in the microwave region. A single gallium arsenide metal semiconductor field-effect transistor (MESFET) is switchably coupled by means of PIN diodes through selected output matching networks consisting of relatively narrow-band frequency sections. Bias to the MESFET is provided through PIN diodes in a manner to select a linear (fundamental frequency) or nonlinear (multiplied frequency) operating region. In this manner a single microwave active device may be utilized with a plurality of passive networks to achieve extremely wideband amplification meeting good amplification and impedance matching criteria.

9 Claims, 3 Drawing Figures



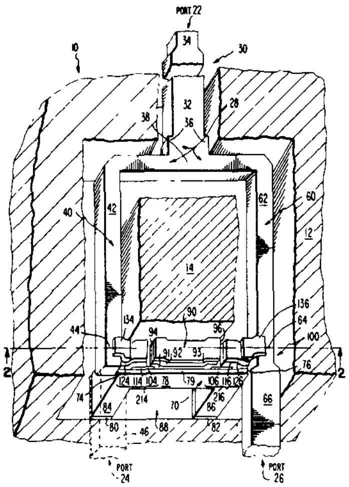
4,401,955 Aug. 30, 1983

Broadband, High-Power, Coaxial Transmission Line Coupling Structure

Inventors: Leonard H. Yorinks, Curtis E. Milton, Jr.
Assignee: RCA Corporation.
Filed: July 15, 1981.

Abstract—A low VSWR, high isolation microwave matched coaxial transmission line power divider/combiner compensates for parasitic reactances with lumped compensating elements to yield a compact, densely packable structure.

6 Claims, 9 Drawing Figures



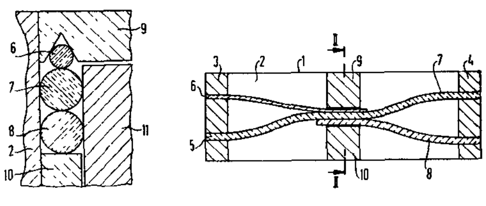
4,402,568 Sept. 6, 1983

Method and Apparatus for an Optical Four-Gate Coupler

Inventors: Vaclav Kulich, Herbert Michel, Hans-Hermann Witte.
Assignee: Siemens Aktiengesellschaft.
Filed: Feb. 9, 1981.

Abstract—Method and apparatus for an optical four-gate coupler wherein the junction between two large fiber optical waveguides of the same diameter are connected to a fiber optical waveguide having a smaller diameter and wherein a guide part is formed with a groove for engaging the small fiber optical waveguide and the distance from the center line of said groove to the edge of the guide is equal to the diameter of the larger waveguides so that the guide part and a detent can hold the two large waveguides and the smaller waveguide in aligned contacting positions and a cover plate fits over at least the two large waveguides. Such structure is then cut transverse to the center axis of the three waveguides and the ends are polished and then coupled together so as to provide an optical four-gate coupler. The modification comprises forming a groove having a width equal to the diameter of the larger fiber optical wave-guide fibers and a depth which is equal to two times the diameter of a thick fiber plus one time the diameter of the smaller fiber and wherein a number of smaller fibers are placed in the bottom of the groove and the two larger fibers are placed into the groove on top of the smaller fibers and are pressed with a cover member against the smaller fibers so that at least one of the smaller fibers is in good aligned contact with one of the larger fibers.

28 Claims, 7 Drawing Figures



4,403,825 Sept. 13, 1983

Integrated Optics Thin-Film Devices and Fabrication Thereof

Inventors: Gregory L. Tangonan, David L. Persechini.
Assignee: Hughes Aircraft Company.
Filed: Nov. 14, 1980.

Abstract—There is disclosed a class of integrated optics devices comprising a variety of optical elements such as waveguides, lenses, couplers and the like, and a method of fabrication thereof. In particular, there is disclosed an aberration-free geodesic lens for integrated optics devices. In these devices, photo-induced refractive index changes in chalcogenide glass films may be used to fabricate a radial index of refraction distribution profile in order to form a lens. By varying the exposure of the thin film to ultra-violet light, variable index of refraction profiles may be formed. The variable profile may itself form the lens or, preferably, a thin film may be deposited on an aspherical geodesic lens in order to provide correction of focal length, thus reducing the.

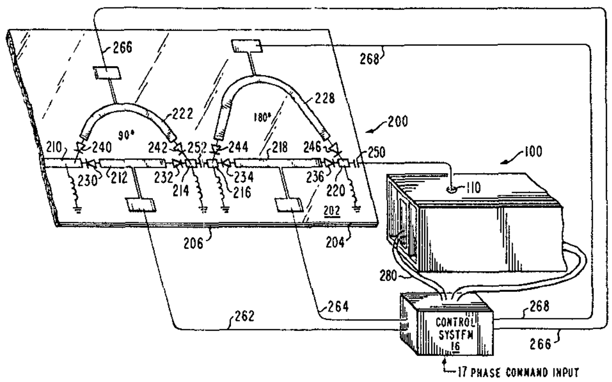
4,405,907 Sept. 20, 1983

Controllable Phase Shifter Comprising Gyromagnetic and Non-Gyromagnetic Sections

Inventors: Maurice E. Breese, Arthur S. Robinson.
Assignee: RCA Corporation.
Filed: Oct. 26, 1981.

Abstract—A phase shifter has two sections, a gyromagnetic section and a switching section connected in series. The gyromagnetic section provides fine increments of phase shift and the switching section provides larger increments of phase shift.

8 Claims, 4 Drawing Figures



4,406,513 Sept. 27, 1983

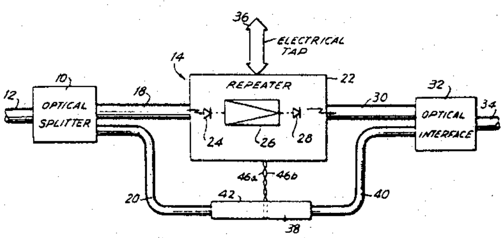
Optical Repeater System Having an Automatic Optical By-Pass

Inventor: Howard A. Raphael.
Assignee: Cermetek, Inc.
Filed: Mar. 11, 1981.

Abstract—Apparatus for transmitting an optical information signal from an input fiber optic cable to an output fiber optic cable includes a first regenerative repeater path having a first diode for converting the optical information signal to an electrical signal, an amplifier for amplifying the electrical signal,

and a second diode for converting the amplified electrical signal to an amplified optical information signal and for supplying this latter signal to the output fiber optic cable; and a second by-pass path including a fiber optic liquid crystal gate having an input cable with a first optical end face, an output cable with a second optical end face in opposing relation to the first optical end face and separated therefrom, and a liquid crystal window disposed between the optical end faces and adapted to be supplied with a signal from the repeater path, with the liquid crystal window being automatically rendered transparent when no signal is supplied thereto, indicating a power failure to the repeater path or a malfunction in the repeater path, so as to pass the optical information signal from the input fiber optic cable to the output fiber optic cable, and with the liquid crystal window being rendered opaque to block any optical signal from passing therethrough when a signal from the repeater path is supplied thereto, indicating no power failure to or malfunction in the repeater path.

11 Claims, 2 Drawing Figures



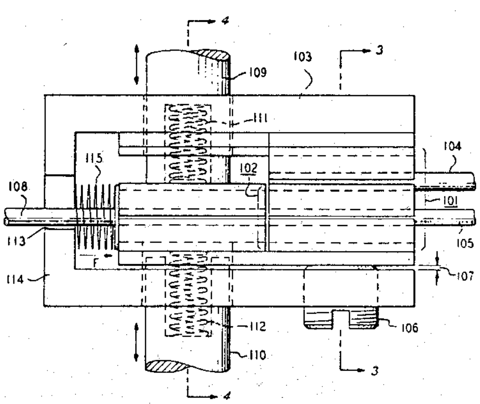
4,407,562 Oct. 4, 1983

Optical Fiber Switch

Inventor: William C. Young.
Assignee: Bell Telephone Laboratories Incorporated.
Filed: Oct. 1, 1982.

Abstract—Switching between optical fibers is achieved through the use of a fixed (101) and a moveable (102) housing disposed within a slotted support member (103, 205). The fixed and moveable housings respectively contain first (104, 105) and second (108) sets of optical fibers. Each housing has two grooved (204) and parallel exterior surfaces. Both housings are disposed in substantial abutment to one another in the slotted support member with both sets of optical fibers parallel to one another. The sidewalls of the slot are grooved to be the mating opposite of the grooved housing surfaces. The first housing is fixedly positioned in the slot by the mutual engagement of the grooved exterior housing surfaces and the grooved sidewalls. Switching between optical fibers is accomplished by the translation of the moveable housing surfaces to either of two positions which axially aligns a predetermined number of optical fibers in the first and second sets. Each position of the moveable housing is precisely determined by the engagement of one grooved exterior housing surface and one grooved sidewall.

13 Claims, 4 Drawing Figures



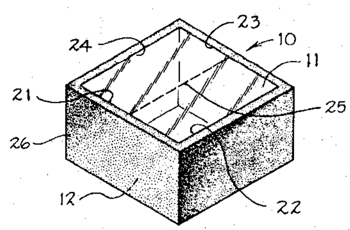
4,407,566 Oct. 4, 1983

Optical Filter

Inventors: William J. Rosenberg, Alan M. Title,
Assignee: Lockheed Missiles & Space Co., Inc.,
Filed: Sept. 29, 1981.

Abstract—A filter element for a narrow-passband optical filter comprises a birefringent crystal (10) having a rectangular parallelopiped configuration with an entrance face (11), an exit face (12) and side walls (21,22,23,24). The optic axis (25) of the crystal (10) is parallel to the entrance and exist faces (11 and 12). The side walls (21,22,23,24) are polished to provide total internal reflection of optical energy incident thereon at greater than a critical angle as measured from the normal. By covering the side walls (21,22,23,24) with a coating whose index of refraction is given by the algorithm $n = (N^2 = \sin^2 \theta)^{1/2}$, where n is the index of refraction of the coating, N is the lower index of refraction of the crystal (10), and θ is a half-angle defining the maximum field of view in air for the filter element, the critical angle for total internal reflection is made substantially equal to the half-angle defining the maximum field of view. In this way, vignetting is suppressed and a wide field of view is obtained.

19 Claims, 3 Drawing Figures



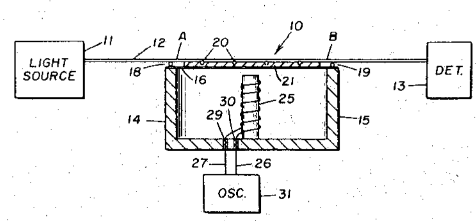
4,408,829 Oct. 11, 1983

Fiber-Optic Transducers

Inventors: Robert W. Fitzgerald, Jr., Robert L. Hall, Gary P. Bickford.
Assignee: Schlumberger Technology Corporation.
Filed: Jan. 30, 1981.

Abstract—Method and apparatus for detecting and converting pressure signals to modulated light signals by microbending optical fibers as a function of the pressure signals. Transducers are described which include a length of multimode optical fiber supported at spaced points across a flexible diaphragm. Movement of the diaphragm in response to the pressure signals microbends the optical fiber to induce attenuation of light travelling along the fiber as a function of the signals.

6 Claims, 3 Drawing Figures



4,409,566 Oct. 11, 1983

Coaxial Line to Waveguide Coupler

Inventors: Willard T. Patton, Robert J. Mason.
Assignee: RCA Corporation.
Filed: Oct. 21, 1981.

Abstract—A coaxial transmission line to waveguide transition is formed of two waveguide portions disposed on opposing sides of, and enclosing a portion of, a flat plate structure. The enclosed portion of the flat plate structure includes a tapered slot extending through the flat plate structure leaving portions of the flat plate structure protruding into the waveguide as loading ridges which provide impedance matching (transformation) between the coaxial line and the unloaded waveguide. The flat plate structure has a hollow therein and an inner conductor passing therethrough forming a coaxial line. The inner conductor crosses the tapered slot within the waveguide enclosure.

8 Claims, 5 Drawing Figures