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.

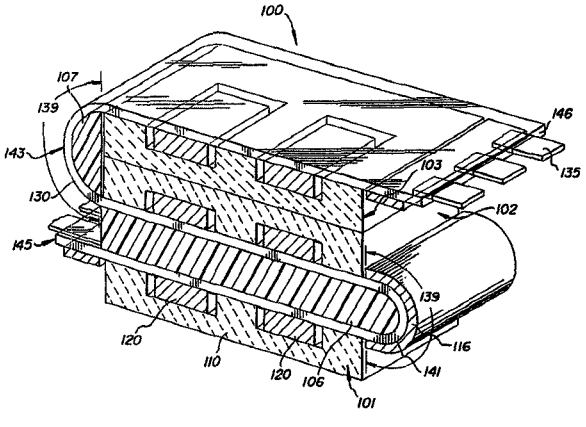
5,345,205 Sept. 6, 1994

Compact High-Density Interconnected Microwave System

Inventor: William P. Kornrumpf.
Assignee: General Electric Company.
Filed: Apr. 5, 1990.

Abstract—A multimodule microwave system is assembled in a physically compact, high reliability manner employing a high-density interconnect structure to interconnect the different modules of a microwave system by rendering the portion of the interconnect structure between modules flexible and by folding the interconnect structure on appropriate sized mandrels between the modules to place the modules in a multitier physical stack. Shielding and hermetic packaging may also be provided.

26 Claims, 10 Drawing Sheets



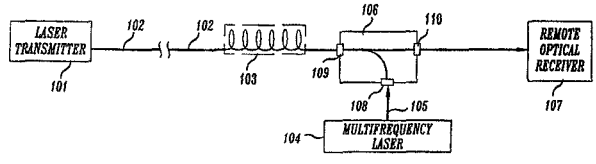
5,345,331 Sept. 6, 1994

Technique for Reducing Polarization-Dependent Gain in an Amplified Optical Transmission System

Inventors: Neal S. Bergano, Vincent J. Mazurczyk, and John L. Zyskind.
Assignee: AT&T Bell Laboratories.
Filed: Apr. 13, 1993.

Abstract—A technique employing a depolarized optical source to reduce the polarization-dependent gain associated with the optical pump signal used to excite doped fiber amplifiers within an optical transmission system. Pumping the doped fiber amplifiers with a signal that has no single predominant linear SOP equalizes the gain of the amplifiers. A particular embodiment of the invention includes a pump comprised of a passive polarization scrambler coupled to the output of a multifrequency optical laser. The simple, passive arrangement keeps overall system costs to a minimum and increases reliability.

13 Claims, 2 Drawing Sheets



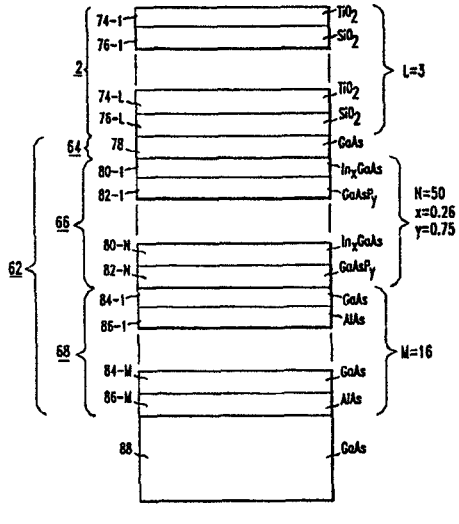
5,345,454 Sept. 6, 1994

Antiresonant Fabry-Perot P-I-N Modulator

Inventor: Ursula Keller.
Assignee: AT&T Bell Laboratories.
Filed: Jan. 27, 1993.

Abstract—The advantages of both active and passive modelocking techniques are realized within a single device by providing a p-i-n modulator formed at antiresonance within a Fabry-Perot etalon. The p-i-n modulator actively modulates light within the laser cavity by introducing periodic loss in response to changing voltages applied to the modulator. The p-i-n modulator includes an intrinsic region that is disposed between a p-doped region and an n-doped region. The modelocking performance of the p-i-n modulator is enhanced by the saturable absorber action of the intrinsic region.

10 Claims, 4 Drawing Sheets



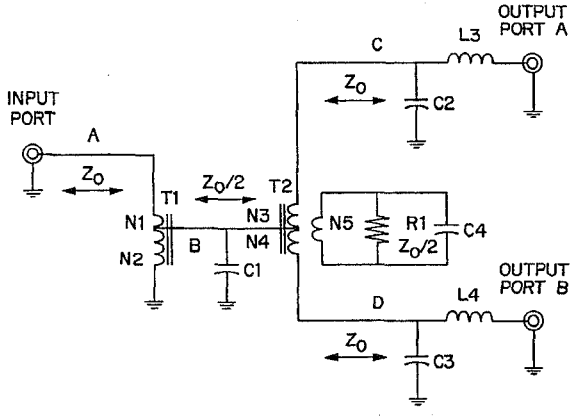
5,347,245 Sept. 13, 1994

CATV Signal Splitter

Inventors: W. Andrew Wright, Jr.
Assignee: Bark Lee Yee.
Filed: Nov. 5, 1993.

Abstract—A signal splitter circuit accepts an input signal and conveys the input signal to two output ports. The circuit operates with minimal attenuation, throughout a very wide bandwidth, and also effectively isolates the output ports from each other. The signal from the input port is coupled to an autotransformer, and the ends of the autotransformer are connected to the respective output ports. A bridge load circuit, which includes a transformer winding and a load connected in parallel, is inductively coupled to the autotransformer. The bridge load circuit has no connection to the splitter circuit, other than through the inductive coupling. The splitter circuit also includes inductors in series with the output ports and capacitors in parallel with the output ports. The circuit provides a balanced bridge circuit which cancels signals traveling between the output ports, and the inductors and capacitors provide impedance matching between the input port and output ports. The arrangement of the bridge load circuit places the leakage inductance of the autotransformer outside the effective path of the bridge load circuit, so that the leakage inductance cannot cause unwanted and unpredictable phase shifts at high frequencies.

14 Claims, 2 Drawing Sheets



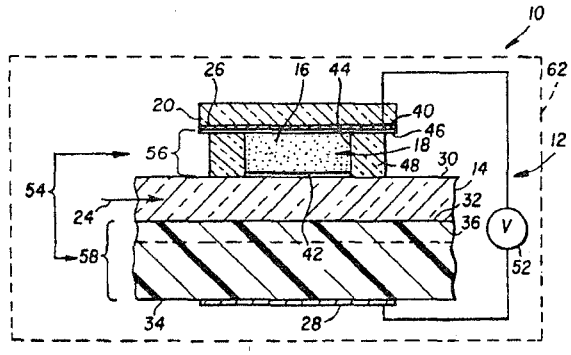
5,347,377 Sept. 13, 1994

Planar Waveguide Liquid Crystal Variable Retarder

Inventors: Joseph F. Revelli, Jr., Eric T. Prince, Steven C. Switalski, and Hsue-Yang Liu.
Assignee: Eastman Kodak Company.
Filed: June 17, 1992.

Abstract—A waveguide optical device having a guide member for propagation of light in a longitudinal direction. The guide member has upper and lower boundaries. A mass of birefringent material is disposed proximal to the guide member. The birefringent material has molecular dipoles subject to alignment by an imposed electrical field. The birefringent mass is overlapped by the optical field of the propagated light. An upper electrode is disposed in spaced relation to the birefringent mass. A lower electrode is disposed in spaced relation to the guide member. The electrodes have the capability of imposing an alternating current voltage across the birefringent mass to rotate the molecular dipoles of the birefringent mass in a plane defined by the normal to the guide member and the propagation vector of the light. The boundaries and the electrodes define an upper isolation zone between the upper electrode and the upper boundary, a guide path between the boundaries, and a lower isolation zone between the lower boundary and the lower electrode. The guide path has an effective index of refraction greater than the effective indexes of refraction of the isolation zones.

24 Claims, 5 Drawing Sheets



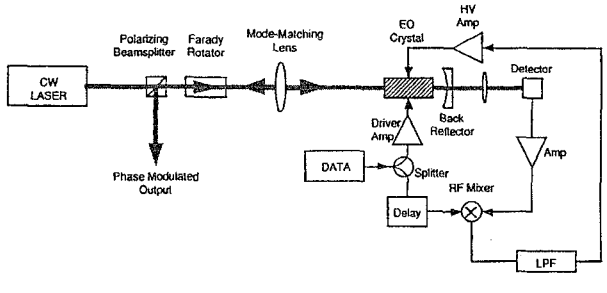
5,347,392 Sept. 13, 1994

Electrooptic Resonant Phase Modulator

Inventors: Chien-Chung Chen, Deborah L. Robinson, and Hamid Hemmati.
Assignee: The United States of America as represented by the Administrator of the National Aeronautics and Space Administration.
Filed: Feb. 26, 1992.

Abstract—An electrooptic resonant cavity is used to achieve phase modulation with lower driving voltages. Laser damage thresholds are inherently higher than with previously used integrated optics due to the utilization of bulk optics. Phase modulation is achieved at higher speeds with lower driving voltages than previously obtained with nonresonant electrooptic phase modulators. The instant scheme uses a data locking dither approach as opposed to the conventional sinusoidal locking schemes. In accordance with a disclosed embodiment, a resonant cavity modulator has been designed to operate at a data rate in excess of 100 Mbps. By carefully choosing the cavity finesse and its dimension, it is possible to control the pulse switching time to within 4 ns and to limit the required switching voltage to within 10 V. Experimentally, the resonant cavity can be maintained on resonance with respect to the input laser signal by monitoring the fluctuation of output intensity as the cavity is switched. This cavity locking scheme can be applied by using only the random data sequence, and without the need of additional dithering of the cavity. Compared to waveguide modulators, the resonant cavity has a comparable modulating voltage requirement. Because of its bulk geometry, resonant cavity modulator has the potential of accommodating higher throughput power. Furthermore, mode matching into a bulk device is easier and typically can be achieved with higher efficiency. On the other hand, unlike waveguide modulators that are essentially traveling wave devices, the resonant cavity modulator requires that the cavity be maintained in resonance with respect to the incoming laser signal. An additional control loop is incorporated into the modulator to maintain the cavity on resonance.

16 Claims, 8 Drawing Sheets



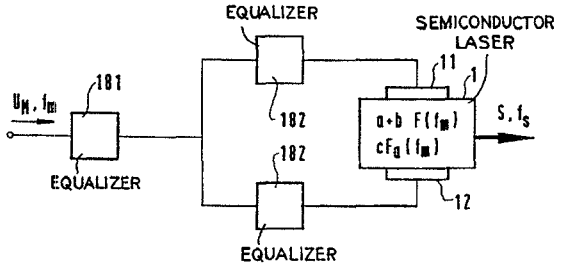
5,347,529 Sept. 13, 1994

Method for Generating a Distortion-Free, Frequency-Modulated Optical Signal and Apparatus for the Implementation of Such a Method

Inventor: Reinhold Noe.
Assignee: Siemens Aktiengesellschaft.
Filed: July 23, 1993.

Abstract—Method and apparatus for generating a distortion-free, frequency-modulated optical signal, whereby this signal from an optical semiconductor laser driven with a modulating voltage is distorted by the modulating voltage due to a thermally conditioned frequency transfer function of the transmitter for the modulation frequency of the modulating voltage. For generating the distortion-free, frequency-modulated optical signal, the modulating voltage and/or the distorted, frequency-modulated optical signal itself and/or a superimposition signal containing this optical signal is subjected to a distortion that entirely or partially compensates the distortion of this optical signal. This method is simple and, in combination with receivers for the frequency-modulated optical signal, avoids sensitivity losses.

38 Claims, 5 Drawing Sheets



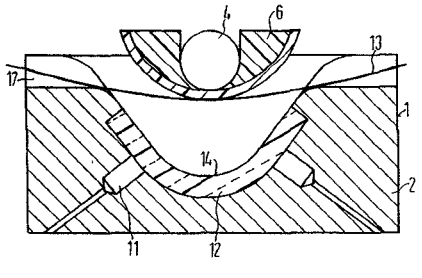
5,347,602 Sept. 13, 1994

A Device for Bending a Light Waveguide to Detect Signal Therein

Inventor: Lothar Finzel.
Assignee: Siemens Aktiengesellschaft.
Filed: Mar. 2, 1993.

Abstract—A light waveguide signal detector enables testing for the transmission of a signal in a light waveguide without disturbing the transmission of the signal. The light waveguide signal detector comprises a base part having a pressure trough lined with an optically transparent material, at least one light receiver being arranged under the elastic material, a pressure part for deflecting the light waveguide to obtain an emergence of a light signal therefrom, and a light covering for protecting against stray light surrounding a portion of the pressure part that engages the optical fiber.

14 Claims, 2 Drawing Sheets



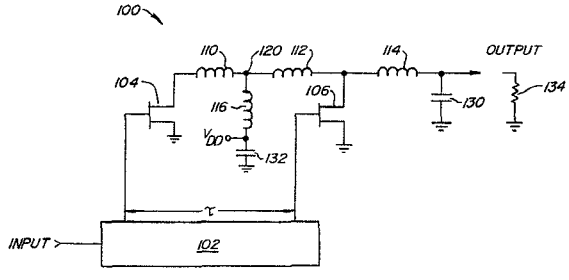
5,349,306 Sept. 20, 1994

Apparatus and Method for High-Performance Wide-Band Power Amplifier Monolithic Microwave Integrated Circuits

Inventor: Thomas R. Apel.
Assignee: Teledyne Monolithic Microwave.
Filed: Oct. 25, 1993.

Abstract—A distributed amplifier produced from monolithic microwave integrated circuit (MMIC) processes employs a bandpass filter structure as opposed to a low-pass filter network to enhance gain, efficiency, and output power over wideband operation of 6–18 GHz. Derivation of the preferred embodiment is shown from a three-port circuit employing bandpass filter image-parameter half-sections.

2 Claims, 7 Drawing Sheets



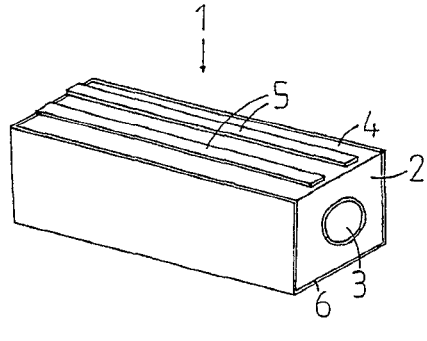
5,349,315 Sept. 20, 1994

Dielectric Filter

Inventor: Jouni Ala-Kojola.
Assignee: LK-Products OY.
Filed: Dec. 21, 1993.

Abstract—A ceramic filter can be made small in size by forming one or more strip-line resonators (**5**) on a side surface (**4**) of the ceramic resonator, the side surface additionally having contact and coupling electrodes that can be formed using the same mask as for the strip-line resonators. The strip-line resonators (**5**) produce zeros in the transfer function of the filter and thereby increase the attenuation at a desired frequency, e.g. the image frequency.

10 Claims, 1 Drawing Sheet



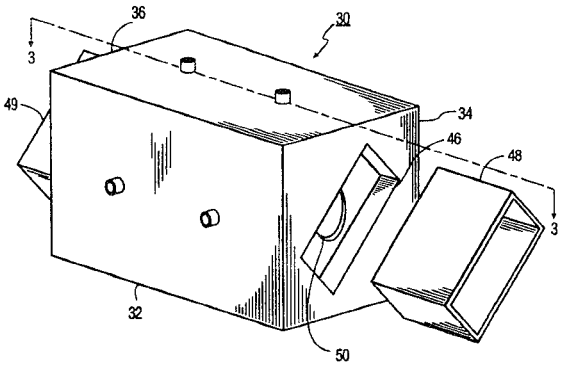
5,349,316 Sept. 20, 1994

Dual Bandpass Microwave Filter

Inventor: William G. Sterns.
Assignee: ITT Corporation.
Filed: Apr. 8, 1993.

Abstract—A two-port dual bandpass microwave filter consisting of "n" resonant cavities Each cavity resonates in two independent modes at displaced frequencies so that the filter has two passbands in a desired frequency band. By orienting an incoming waveguide at an angle with respect to the filter, both TE and TM modes can be excited to produce two separate passbands. The passbands may have either equal or unequal characteristics. Fine tuning of the TE and TM modes is accomplished using tuning plungers or tuning screws. The dual bandpass response of the new filter is achieved by utilizing the $TE_{1,1,1}$ and $TM_{0,1,0}$ modes in right circular cylindrical cavities, or equivalent modes in rectangular or other cavities. These modes are orthogonal so they do not couple to each other. The cavity loaded Q's are independently adjustable, so the two passbands can have the same or different bandwidths, the same or different amplitude ripples and the same or different phase responses. The dual bandpass microwave filter provides filtering with but one set of cavity resonators rather than two It does not require three-port microwave junctions with critical path lengths. The filter is well-suited to filter the output of a single transmitter capable of operation at two differential frequencies.

20 Claims, 9 Drawing Sheets



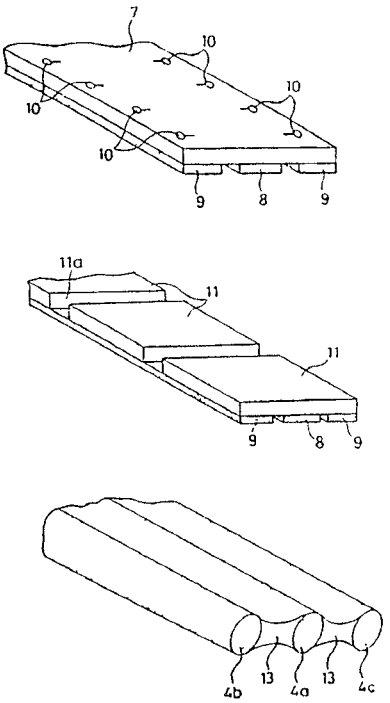
5,349,317 Sept. 20, 1994

High-Frequency Signal Transmission Tape

Inventors: Yoshihiro Notani and Takayuki Katoh.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Mar. 31, 1993.

Abstract—A high-frequency signal transmission tape for connecting a plurality of high frequency IC chips to each other or connecting a high frequency IC chip to a signal transmission line disposed on a package includes an insulating thin film having a surface; a conductive signal line disposed on the surface, and two conductive grounding lines disposed on the surface on opposite sides of, parallel to, and spaced from the signal line. The signal transmission tape produces small reflection and attenuation of signals in an extremely high-frequency band, i.e., a millimeter-wave frequency band over 30 GHz. Therefore, high-frequency IC chips arbitrarily arranged on a package are easily connected using the high-frequency signal transmission tape.

6 Claims, 16 Drawing Sheets



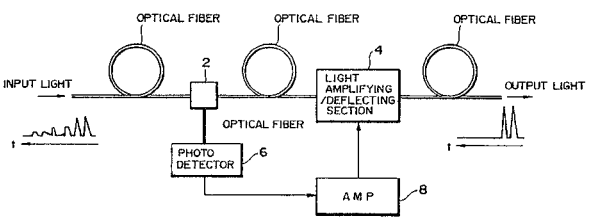
5,350,913 Sept. 27, 1994

Light Pulse Intensity Regenerator, Light Transforming Repeater, Pre-Amplifier for Light Signal, Light Intensity Change Measuring Apparatus, and Stabilized Light Source

Inventors: Shinichiro Aoshima and Isuke Hirano.
Assignee: Hamamatsu Photonics K.K.
Filed: Apr. 23, 1993.

Abstract—Input light incident into fiber end is separated by a light separator. Light traveling straight through the light separator is guided through an optical fiber to a light-amplifying and -deflecting section, where only components with deflection angle in a predetermined range are amplified and deflected then to be extracted. The extracted components are output as output light through an optical fiber. The other part of light separated by the light separator is received by a photodetector. The light received by the photodetector is converted into an electric signal, and the electric signal is then input into the light amplifying and deflecting section. Using the electric signal generated from the photodetector, desired wave shaping may be effected by adjusting a light amplification factor of the light amplifying and deflecting section, a change speed of deflection angle, and/or a range of deflection angle selected.

28 Claims, 17 Drawing Sheets



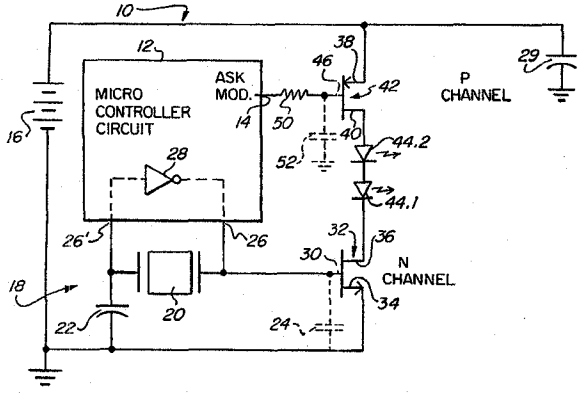
5,351,149 Sept. 27, 1994

ASK Optical Transmitter

Inventor: James W. Crimmins.
Assignee: K and M Electronics, Inc.
Filed: Mar. 25, 1993.

Abstract—An amplitude-shift-keyed (ASK) optical transmitter is described for generating an ASK modulated infrared signal from a light-emitting-diode (LED). The transmitter includes a dc-powered microcircuit for generating an ASK modulation signal. A pair of mosfet devices are connected in series with one or more LED's between the mosfets. An oscillator signal used to operate the microcircuit is also employed as a carrier signal to activate one mosfet while the ASK modulating signal is coupled to operate the other mosfet. Input capacitances of the mosfets are used to tune the oscillator signal and smooth the leading and trailing edges of the ASK modulation signal. Several embodiments are described.

15 Claims, 1 Drawing Sheet



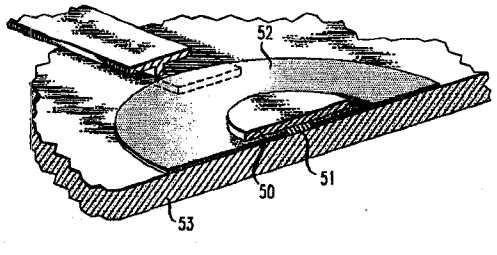
5,351,261 Sept. 27, 1994

Integrated Optics

Inventors: Louis D. Lanzerotti, Samuel L. McCall, and Bernard Yurke.
Assignee: AT&T Bell Laboratories.
Filed: Apr. 14, 1993.

Abstract—Lasing threshold for a whispering mode laser is reduced by appropriate placement of a reflector. A reflector parallel to, and within a wavelength distance of, the disk decreases radiation loss due to imperfect internal reflection. Enhancement is calculable on the basis of destructive interference between reflected and direct radiation.

23 Claims, 4 Drawing Sheets



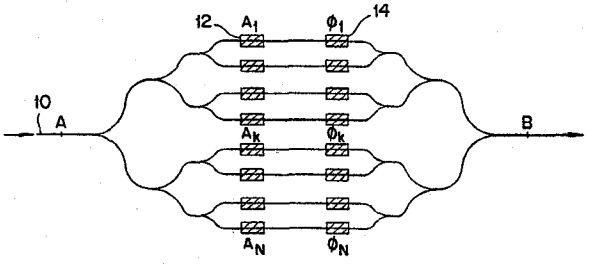
5,351,317 Sept. 27, 1994

Interferometric Tunable Optical Filter

Inventor: Jean-Pierre Weber.
Assignee: Telefonaktiebolaget L M Ericsson.
Filed: Aug. 14, 1992.

Abstract—An interferometric tunable optical filter selects a predetermined wavelength or wavelengths from a wavelength-division-multiplexed signal. The optical filter splits an input signal into a plurality of waveguide branches. In each branch, the amplitude and phase of the signal can be individually controlled. The signals are then recombined. The resulting interference gives a wavelength-dependent transmission spectrum that can be adjusted as desired.

15 Claims, 3 Drawing Sheets



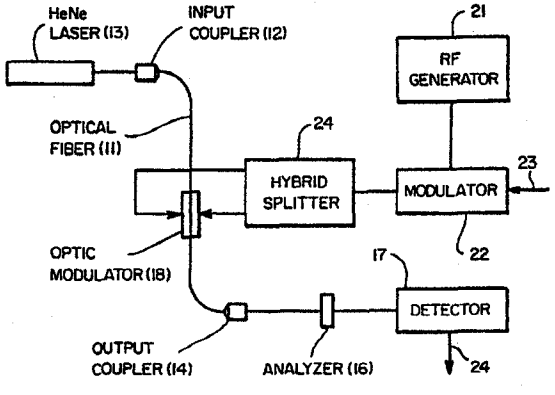
5,351,318 Sept. 27, 1994

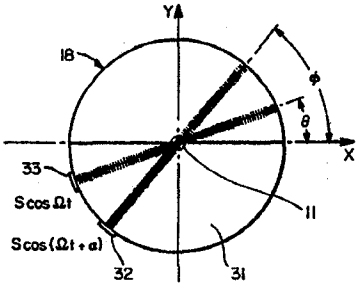
Fiber-Optic Communication System and Fiber-Optic Modulator

Inventors: Michial D. Howell and Gordon S. Kino.
Assignee: The Board of Trustees of the Leland Stanford Jr./University.
Filed: Apr. 5, 1993.

Abstract—A modulator adapted to be acoustically coupled to an optical fiber for applying acoustic waves across the fiber at a spatial and phase angle with respect to one another to compress and decompress the optical fiber at said spatial angle responsive to an electrical signal whereby to modulate the polarization state of an optical wave travelling past said modulator. An optical communication system in which light waves are transmitted from a transmitting end to a receiving end and whose polarization is modulated by an acoustic modulator responsive to an input signal and the output signal is demodulated to recover the signal.

14 Claims, 4 Drawing Sheets





5,351,325 Sept. 27, 1994

Narrow Band Mach-Zehnder Filter

Inventors: William J. Miller and Daniel A. Nolan.
Assignee: Corning Incorporated.
Filed: Apr. 29, 1993.

Abstract—A Mach-Zehnder filter includes an input coupler for splitting an input signal into N equal output signals, where $N > 2$, and a signal combining coupler for combining N optical signals into a single output signal. It further includes N optical waveguide fibers for connecting the N outputs from the input coupler to the signal combining coupler. Each of the N optical fibers subjects the light propagating therethrough to a delay that is different from the delay experienced by light propagating through each of the other optical fibers. This Mach-Zehnder filter exhibits greater finesse per stage than previous Mach-Zehnder devices, finesse being the ratio of the wavelength separation between adjacent peaks to the peak widths.

13 Claims, 6 Drawing Sheets