Intellectual Property

Remote Light has developed ultraviolet (UV) fluid and air treatment technology that is many times faster, more effective and more energy efficient than conventional systems at the same initial cost. The technology is supported by a strong portfolio of global patents, including patents developed in-house and others covered by exclusive licenses. Remote Light owns or controls more than 120 US and International granted patents, applications, and exclusive patent licenses combining optics with fiber optics and UV light for a broad range of purification and disinfection applications as well as communication of optics with fiber optics and infrared light for data communications.

Remote Light is leveraging these foundation patents with licensing or other partnering activities. It is developing and executing the approach that will maximize the value of its proprietary technology. Potential near-term commercial applications include:
- - Drinking water and wastewater purification & disinfections, for example, eliminating highly infectious microbes like Cryptosporidium, for which traditional solutions like chlorine are ineffective;
- - Air pollution/contaminant treatment via photocatalysis, to remove airborne viruses like Legionnaire’s disease;
- - Surface and food disinfection to remove pathogens in the food processing industry;
- - Blood disinfection, for example transfusions where storage time is very limited but the time required for tests for multiple viruses has increased.

Drinking water, wastewater, and air purification and disinfection are by far the largest markets for RLI’s IP licensing program. Global warming is a recognized and growing issue. China and India may soon overtake the US as the largest global polluters. Climate change will directly affect human health with dirtier air and water with stress on and possible collapse of many ecosystems that now purify our air and water. Despite technology, humans everywhere cannot live without clean water, clean air, and soil to produce food. Over 20% of the world’s population live in drought conditions. In the developed nations, wastewater contamination has doubled over the last 10 years. Worldwide water consumption has doubled over the last 50 years.

RLI is particularly interested in finding prospective licensees who are providing solutions to the growing challenges to the availability of pure water and air in both developed and emerging parts of the world. The Remote Light patent portfolio consists of know-how and the following patents & applications, listed below, which includes US and multiple foreign publications.

*Click the patent number to read the entire patent and hover over the blue "Abstract" dot to read the patent summary US Patents Title Abstract Publication Date Application Date International Patents

6447721 Drinking Water UV Disinfection System and Method {mostip tooltip=1 title=Abstract}An ultraviolet (UV) disinfection system and method for treating fluids including a configuration and design to function effectively with at least one UV light source or lamp that is not submerged in the fluid, which provides exposure to at least one UV dose zone. The UV light source may be presented in a vertical riser configuration, wherein the UV light source is positioned above the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving upward toward the UV light source. Alternatively, the UV light source may be prsented in a non-vertical riser configuration, wherein the UV light source is positioned above the fluid within a reservoir and a UV dose zone projected downward into the static fluid.{/mostip} 9/10/2002 11/28/2000

WO/2002/092514
EP1353704
ES2292535 (T3)
CN1494436
DE60130371 (T2)
IE 1353704
LU 01273943
FR 1353704
IT 13537046403030 Ultraviolet Wastewater Disinfection System and Method {mostip tooltip=1 title=Abstract}An ultraviolet (UV) disinfection system and method for treating for treating waste-containing fluids including a configuration and design to function effectively with at least one UV light source or lamp that is not submerged in the fluid. The UV light source is positioned outside the fluid to be disinfected via exposure to at least one UV dose zone outside the fluid being treated wherein UV light is projected into the at least one dose zone. The UV light source may be presented in a vertical riser configuration, wherein the UV light source is positioned above

the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving upward toward the UV light source. At least one interface plate is used to provide a surface zone for UV disinfection above the fluid and to provide additional treatment means for balancing pH, affecting effluent chemistry, reducing organic chemicals, and the like. Alternatively, the UV light source may be presented in a planar or horizontal design, wherein the UV light source is positioned above the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving in a direction substantially perpendicular to the UV dose zone. Thirdly, the UV light source may be presented in a reservoir configuration, wherein the UV light source is positioned above the fluid to be treated that is contained in a reservoir.{/mostip}
6/11/200211/28/2000WO/2002/055438
CA2430057
CN1487842
EP1365814
AU2002243252
MXPA03004766
6447720 Ultraviolet Fluid
Disinfection System and
Method {mostip tooltip=1 title=Abstract}An ultraviolet (UV) disinfection system and method for treating for treating fluids including a configuration and design to function effectively with at least one UV light source or lamp that is not submerged in the fluid. The UV light source is positioned outside the fluid to be disinfected via exposure to at least one UV dose zone outside the fluid being treated wherein UV light is projected into the at least one dose zone. The UV light source may be presented in a vertical riser configuration, wherein the UV light source is positioned above the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving upward toward the UV light source. Alternatively, the UV light source may be presented in a planar or horizontal design, wherein the UV light source is positioned above the fluid to be treated and projecting a WV dose zone downward toward and into the fluid to be treated, with the fluid moving in a direction substantially perpendicular to the UV dose zone. At least one interface plate is used to provide a surface zone for UV disinfection above the fluid and to provide additional treatment means for balancing pH, affecting effluent chemistry, and the like.{/mostip} 9/10/20027/31/2000WO/2002/009774
AU7809001
EP1322341 6730265 Air UV Disinfection
Device and Method {mostip tooltip=1 title=Abstract}An ultraviolet disinfection (UV) system for gases including a UV light-ready gas purifier having at least one portal in the gas purifier for receiving UV light input from a UV light source, which is removably connected to the gas purifier via a connector at the portal, and positioned to provide a focused, controllable UV light output that has at least one UV dose zone for providing effective sterilization of microorganisms and disinfection within an interior of the gas purifier. The light source is positioned within a housing that is external to the gas purifier and capable of being connected thereto via optical connectors, such as fiber optic transmission lines. A method for UV disinfection of the interior of gas purifiers is also included in the present invention.{/mostip}

5/4/2004

2/18/2005

11/2/2001

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WO/2003/037389
CN1612754
EP1450865
JP4339118
MXPA04004226
IN 2098486558410 Cardiac Deblocking
Device and Method {mostip tooltip=1 title=Abstract}A device and method for the surgical removal of tissue from a mammalian body, specifically ateriosclerotic plaques from human beings, including a photo-degradatory endoscope having a tip end and a tubular body connected to a power source, a light source, controls, and a viewer, which are remote from the tip end, the tubular body comprising a light-transmissive material such that the catalyst-activating wavelengths emitted from the light source are transmitted to the tip end and through a tip into the body; and a photocatalyst for tissue degradation that is presented proximal the tip end for making a reaction with catalyst-activating wavelengths transmitted from the light source through the tubular body, through the tip and into the body.{/mostip}
5/6/200311/28/2000

WO/2002/056746
EP1351645
AU2002241525 6737020 Microorganism Neutralization Device and Method {mostip tooltip=1 title=Abstract}A processing method for treating organics-containing fluids including a ultraviolet (UV) disinfection step and a biological processing step. The UV light source employed in the UV disinfection step is positioned outside the fluid to be disinfected and the fluid is disinfected via exposure to at least one UV dose zone outside the fluid being treated wherein UV light is projected into the at least one dose zone. The UV light source may be presented in a vertical riser configuration, wherein the UV light source is positioned above the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving upward toward the UV light source. At least one interface plate is used to provide a surface zone for UV disinfection above the fluid and to provide additional treatment means for balancing pH, affecting effluent chemistry, reducing organic chemicals, and the like. Alternatively, the UV light source may be presented in a planar or horizontal design, wherein the UV light source is positioned above the fluid to be treated and projecting a UV dose zone downward toward and into the fluid to be treated, with the fluid moving in a direction substantially perpendicular to the UV dose zone. After neutralization, the fluid is directed to the biological processing step, wherein microbes or enzymes are contacted with the fluid to effect metabolism of the organics in the fluid. The process may be used to reduce the organic load of animal and non-animal wastes, as well as produce a desired product from microbial foodstocks or enzyme substrates.{/mostip} 5/18/200411/28/2000WO/2002/043782
AU22866302
EP1355679 6454937 UV Light Reactor {mostip tooltip=1 title=Abstract}A water disinfection system includes a housing having a plurality of risers therein for directing independent columns of water from a manifold at the bottom of the housing. An ultraviolet light source is disposed above the risers to treat the water flowing therein. The UV light source may also be in the form of a fiber optic system or a mercury arc lamp including a parabolic reflector 64. Each of the risers can also include notches for inducing turbulence to the water flowing thereover in order to ensure that all of the microorganisms receive ultraviolet light. The water flow rate and the light intensity may be adjusted to accommodate different levels of water contamination.{/mostip} 9/24/200210/20/2000 6766097 UV Portal-Based Appliances and Containers {mostip tooltip=1 title=Abstract}A portal-based system for ultraviolet disinfection (UV) of containers and appliances, the system including a container with a housing having at least one portal for receiving UV light input for transmission into the container. The portal is designed such that a fiber optic transmission line is removably connectable to it. This system may include at least one portal optical component positioned between the portal and the interior of the appliance, thereby producing an enhanced sterilization of microorganisms within the container and/or appliance.{/mostip} 7/20/200411/9/2001WO/2003/041745

6524529 Appliances Having UV Disinfection Device and Method {mostip tooltip=1 title=Abstract}An ultraviolet disinfection (UV) system for appliances including at least on UV light-ready appliance having at least one portal in the appliance for receiving UV light input from at least one light source, which is removably connected to the at least one UV light-ready appliance via a connector at the portal, and positioned to provide a focused, controllable UV light output that has at least one UV dose zone for providing effective sterilization of microorganisms and disinfection within an interior of the appliance. Also, an ultraviolet disinfection (UV) system for appliances, the system comprising at least one light source positioned within a housing that is external to at least one appliance and capable of being connected thereto via at least one connector and connected to a power source for producing a UV light output from the housing; this system includes at least one source for producing a UV light output from the housing, thereby producing a focused, controllable UV light output that has at least one UV dose zone for providing effective sterilization of microorganisms within at least one appliance. A method for UV disinfection of the interior of appliances is also included in the present invention.{/mostip}
2/25/200311/28/2000WO/2002/043777
AU3052502
EP1356322 Fiber Optic Light and Communication System {mostip tooltip=1 title=Abstract}A fiber optic network and system for transmitting and receiving both modulated and non-modulated light. In the perferred embodiment, the fiber optic system of the present invention introduces at least one splitter device in combination with a fiber optic having a light and data source for transmitting and receiving both non-modulated and modulated light at the same time. The same fiber bundle network(s) are designed to carry both modualted light and non-modualted light streams simultaneously; these signals may be introduced by separate sources into the system. When the non-modulated and modulated light being transferred by the fiber bundle network is presented to the at least one node, the non-modulated light and the modulated light segregated or separated and rechanneled so as to be distingusihable and detectable in transmission throughout the system and/or collection and interpretation by at least one node.{/mostip} 12/19/20026/12/2001WO/2002/101957 Water Disinfection System Using Ultraviolet Light {mostip tooltip=1 title=Abstract}A water disinfection system and method thereof has a vertical water column directing channel and an ultraviolet light beam generator system. The channel has an open top end

and a channel interior space extending from the open top end. The ultraviolet light beam generator system is arranged such that an ultraviolet light beam generated therein exits through an ultraviolet beam exit and passes through the channel top open end into the channel interior space. The light beam is preferably absorbed by the water to increase efficiency of disinfection and may be collimated with a cross section that is approximately the same as the cross section of the column of water. The column of water has notches at the top end thereof and is longer than the distance the light beam travels before it is absorbed.{/mostip} 10/21/19994/9/1999AU3488599

WO/1999/052566 US20030086817 Blood Purification System {mostip tooltip=1 title=Abstract}An ultraviolet disinfection (UV) system for blood including a UV light-ready blood purifier having at least one portal receiving UV light input from a UV light source that is removably connected to the blood purifier via a connector at the portal. The portal is positioned to provide a focused, controllable UV light output that has at least one UV dose zone for providing effective sterilization of microorganisms and disinfection within the interior of the blood purifier. Also, an ultraviolet disinfection (UV) system for blood purifiers, the system comprising at least one light source positioned within a housing that is external a blood purifier and capable of being connected thereto via at least one connector and connected to a power source for producing a UV light output from the housing; this system includes at least one source for producing a UV light output from the housing, thereby producing a focused, controllable UV light output that has at least one UV dose zone for providing effective sterilization of microorganisms within at least one blood purifier. A method for UV disinfection of the interior of blood purifier is also included in the present invention.{/mostip} 5/8/200311/6/2001WO/2003/039606

EP1450869 US20040175288 Effluent Purification Using UV Devices and Methods {mostip tooltip=1 title=Abstract}An ultraviolet disinfection (UV) system for purifying effluent streams, in particular produced by industrial or mechanical combustion, the system including a UV light-based gas purifier including a UV light source, which is positioned to provide a focused, controllable UV light output into the effluent streams contained by a channel housing that has at least one UV dose zone for providing effective sterilization of microorganisms and disinfection within an interior of the gas purifier. A method for UV purification using gas purifiers is also provided.{/mostip}

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Note: AU=Australia, CA=Canada, CN=China, DE=Germany, EP=Europe, ES=Spain, IN=India, JP=Japan, MX=Mexico, WO=Worldwide Remote Light, Inc. is the EXCLUSIVE licensee of the following global patent portfolio for fiber optics and optics for ANY Ultraviolet Light (UVL) germicidal purification and disinfection applications, including but not limited to, drinking water, wastewater, other fluids, air, medical, consumer appliance and surface applications:US Patents TitleAbstract Publication Date Foreign Publications

6027237 Air Router for Cooling Light Guide Bundle {mostip tooltip=1 title=Abstract}The present invention discloses an air duct for directing air onto an optical fiber bundle coupling. The air duct is used to siphon a portion of an air stream, which is used to cool an arc lamp, to the coupling end of the light guide bundle. After the air from the air duct cools the coupling of the light guide bundle, the air is routed back to provide additional cooling to the arc lamp.{/mostip} 2/22/2000

WO/1998/041794

5911020 Bi-planar Multiport Illuminator Optic Design for Light Guides {mostip tooltip=1 title=Abstract}The inventive system, which is used in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from a lamp, or similar source, into a multiplicity of flexible macroscopic fibers. The combination of several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers. Light from the lamp is fed to a ring-shaped configuration of ports, with each port having one or more flexible macroscopic fibers connected thereto. {/mostip} 6/8/1999

WO/1998/034140

JP2001509917T D417920 Illuminator Housing {mostip tooltip=1 title=Abstract}The ornamental design for an illuminator housing.{/mostip} 12/21/1999

5917986 Large-area Fiber Optic Display using Piezoelectric Shutters {mostip tooltip=1 title=Abstract}A piezoelectric shutter is arranged in a comb pattern and presents a core. The comb is provided with at least one tooth constituting the shutter, the bore being arranged with elevation allowing the displacement of the shutter by the piezoelectric effect. The device is remarkable in that it comprises at least one bimorph arranged on the support, capable of being raised with respect to the support by the piezoelectric effect.{/mostip}

6/29/1999

AU739206
BE1010327
BR9709542
CA2257269
CN1226331
EP1008130
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NO985688
WO/1997/046994

LCD Projection Display for Vehicles {mostip tooltip=1 title=Abstract}A liquid crystal display system for use in a vehicle such as an automobile. The LCD display system generally includes a long life high-efficiency lamp and reflector system for producing a light which is transmitted or transferred into the passenger compartment of the vehicle through a flexible light transmitting element such as an integrating light pipe. The output of the light transmitting element is directed onto the face of a liquid crystal display light valve. The light valve produces an image which is subsequently enlarged and projected onto a display screen using an optical projection lens assembly. A number of devices and techniques for reducing high ambient light conditions on the screen are also disclosed.{/mostip} 9/11/1998WO/1998/039684

5588235

Light Processing Apparatus for Creating Visual Effects {mostip tooltip=1 title=Abstract}Light processing apparatus creates a number of visual effects which simulate movement with light from a light source. A multiplicity of flexible fibre optic light guides having optically finished input and output ends are grouped into groups, with each group being assigned to create a particular effect. The input ends of each group of light guides are placed in adjacent receptor zones of pre-selected geometry, and the output ends of each group of light guides are located on an effects surface in a pre-selected pattern. Light from the light source is filtered by a color changer having a plurality of discrete moveable colored filter zones shaped to correlate with the receptor zones, and is then received by the input ends of the light guides and distributed to the output ends of the light guides. The color changer may be a rotatable color wheel filter, an endless band filter or a cylindrical filter. When the filter is activated, the filter zones successively register with and sweep across the receptor zones, thereby changing the color of the light which is transmitted to the input ends of the various groups of light guides. The subject apparatus also includes a configuration structure which holds the input and output ends of the light guides in pre-selected positions, supports and positions the light source and filter, and encapsulates the light guides. The light processing apparatus can be incorporated into a sign or other lighting product having a display panel or other device for displaying the visual effects.{/mostip} 12/31/1996

WO/1995/000492
EP0656141

Light shutter (at least one bimorph) in the pattern of a comb which can be raised from a support structure by piezoelectric effect {mostip tooltip=1 title=Abstract}A piezoelectric shutter system includes a plurality of elongated bimorphs affixed to a transverse support in a comb pattern and shutters disposed at one end of and substantially perpendicular to the bimorphs. The shutters can be raised by a piezoelectric effect. There may be an infrared coating or reflective oil disposed on the shutters. The support may be transparent to ultraviolet light. The biomorphs may be affixed to the support with glue. A plate and a planar member may be disposed on opposite sides of the system, the planar member including at least one stop in a critical zone above the bimorphs, the stop being recessed from the shutters and adapted to diminish adhesion and vibration of the bimorphs. The system may include a plurality of optical fibres disposed on the plate wherein the shutters do or do not block light emanating from an end of the fibres according to whether the bimorphs are in an off or on position, respectively.{/mostip} 1/28/2000NZ333358

6070985

Multiport Illuminator for Light Guides {mostip tooltip=1 title=Abstract}A light guide illumination system having a metal-halide double-ended illumination source is disclosed. The light guide illumination system includes at least one light guide and two curved reflectors disposed in proximity to the double-ended illumination source. The two curved reflectors are adapted to reflect the emitted light from the double-ended illumination source into the light guide. The light guide illumination system further includes at least one multi-sector lens adapted to receive light from the light guide and at least one output light guide. The multi-sectored lens is adapted to receive the reflected light from the light guide and to focus the light into the output light guide.{/mostip} 6/5/2000CA2294316

EP1005662
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Multiport Illuminator for Macro-fibers {mostip tooltip=1 title=Abstract}The inventive system, which is used

in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from an arc lamp, or similar source, into a multiplicity of flexible macroscopic fibers. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers. The system also provides a very flexible mechanical means for distributing the energy to the fibers and to the remote locations at which the light is used.{/mostip} 1/6/1998
8/4/1998
CA2223477
EP0829026
JP11506563T
JP2001504263T
WO/1998/020377
5708737
Multiport Illuminator Mechanical Design for Macro-fibers {mostip tooltip=1 title=Abstract}The inventive system, which is used in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from an arc lamp, or similar source, into a multiplicity of flexible macroscopic fibers. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers. A first module houses the arc lamp, and a second module generally houses the optics for coupling light to the flexible macroscopic fibers. The second module is thermally insulated from the first module, to thereby prevent high temperatures from leaking from the first module into the second module.{/mostip} 1/13/1998 5862277
Multiport Illuminator Optic Design for Light Guides {mostip tooltip=1 title=Abstract}The inventive system, which is used in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from a lamp, or similar source, into a multiplicity of flexible macroscopic light guides. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the light guides. Light from the lamp is fed to four or more ports, with each port having one or more flexible macroscopic light guides connected thereto.{/mostip} 1/19/1999 5790723 Multiport Illuminator Optic Design for Macro-fibers {mostip tooltip=1 title=Abstract}The inventive system, which is used in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from an arc lamp, or similar source, into a multiplicity of flexible macroscopic fibers. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers. Light from the arc lamp is fed into a circular light pipe, and then directly into a multi-sectored lens, without any requirement of a collimated lens. The multi-sectored lens then focuses the light into the multiplicity of flexible macroscopic fibers.{/mostip}
8/4/1998 Optical Coupler {mostip tooltip=1 title=Abstract}An optical fiber manifold is provided for coupling light from an illumination source to a plurality of spaced, large diameter output fibers, or "light pipes", which are used for a variety of purposes, such as illumination pools, spas, hazardous material zones, jail cells and other applications where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The manifold employs an illumination reflector(s) which has been customized to maximize the efficiency of light transmission between the illumination source, such as an arc lamp, and the cores of the plurality of output fibers. A method of fabricating the customized illumination reflector includes mapping the radiation patterns of the particular illumination source to be utilized, creating a database of those radiation patterns, and utilizing the database to generate an optimal illumination reflector configuration. The computer-generated reflector will virtually always be a non-conic section, because the illumination source is not ideal.{/mostip}

8/21/1997

WO/1997/030367
AU730976
EP0880720 5559911
Optical fiber coupler using segmented lenses
{mostip tooltip=1 title=Abstract}PROBLEM TO BE SOLVED: To provide lighting that accurately illuminates only the core of each optical pipe with the purpose of maximizing efficiency by preventing loss of light. SOLUTION: This is an optical fiber manifold for coupling light beams from a light source into plural output optical fibers, and is characterized by the constitution as follows. The output optical fibers are each provided with a proximal end for receiving the light, while the manifold is equipped with an optical converging element having multiple sections which are set dimensionally unequally. These sections are each provided with a separate focal point, are designed to converge the light from the light source on each such focal point, and are dimensionally set to compensate for the purpose of varying the primary factor of the loss of the optical fibers. The light emitted from the output optical fibers is designed to have an essentially uniform intensity, and each proximity end of the optical fibers is arranged at the focal point of the corresponding light converging element so as to receive light from it.{/mostip} 9/24/1996
AU711855
EP0804748
JP2001188152
MX9705372
SG56206
WO/1996/022555

5857041 Optical coupler and method utilizing optimal illumination reflector
{mostip tooltip=1 title=Abstract}An optical fiber manifold is provided for coupling light from an illumination source to a plurality of spaced, large diameter output fibers, or "light pipes", which are used for a variety of purposes, such as illuminating pools, spas, hazardous material zones, jail cells, and other applications where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The manifold employs an illumination reflector(s) which has been customized to maximize the efficiency of light transmission between the illumination source, such as an arc lamp, and the cores of the plurality of output fibers. A method of fabricating the customized illumination reflector includes mapping the radiation patterns of the particular illumination source to be utilized, creating a database of those radiation patterns, and utilizing the database to generate an optimal illumination reflector configuration. The computer-generated reflector will virtually always be a non-conic section, because the illumination source is not ideal.{/mostip}1/5/1999

5751870 Optical fiber lensed illumination coupler {mostip tooltip=1 title=Abstract}An optical fiber manifold is provided for coupling light from an illumination source to a plurality of spaced, large diameter output fibers, or "light pipes", which are used for a variety of purposes, such as illuminating pools, spas, hazardous material zones, jail cells, and other applications where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The manifold comprises a light converging element, which may be either a lens or a reflector, for converging light separately on each of the spaced optical fibers. The light converging element is segmented, with each segment corresponding to one of the optical fibers, and is precise enough that substantially all of the convergent light is received by the respective cores of each of the spaced output fibers, thereby minimizing light loss.{/mostip}5/12/1998

6137928 Optical Fiber Light Distribution System and Method of Manufacture and Illumination
{mostip tooltip=1 title=Abstract}An optical fiber light distribution system has a first optical fiber and a second optical fiber. The first optical fiber has a side surface, an axis, and a length. The second optical fiber is wrapped about the side surface such that the second optical fiber defines a plurality of wraps about the first optical fiber. The plurality of wraps have a pitch. Pitch is the distance between corresponding points of adjacent wraps measured parallel to the first optical fiber axis. When light is directed through the first optical fiber, portions of the light are extracted by portions of the second optical fiber that contact the first optical fiber. The lower the pitch of the plurality of wraps, the greater the percentage of light extracted into the second optical fiber from the first optical fiber. Further, softer first optical fibers which incur more deformation have increased contact surface with the second optical fiber. The increased contact surface results in an increased percentage of light being extracted into the second optical fiber. Cladding or potting may be used to inhibit light extraction. A process for making the optical fiber distribution system has the step of wrapping the second optical fiber about the first optical fiber. A process for illumination has the step of directing light through the optical fiber light distribution system.{/mostip}10/24/2000

6086234 Parabolic and Spherical Multiport Illuminators for Light Guides
{mostip tooltip=1 title=Abstract}A light guide illumination system, which is used in transmitting illumination from a central source to a variety of remote locations, comprises an illumination source, a configuration of transfer lenses disposed around the illumination source, which are each adapted to focus emitted light from the illumination source in a generally outward direction from the illumination source, a plurality of condenser lenses, and at least one light guide. Each of the plurality of transfer lenses are adapted to focus light into a corresponding condenser lens, and the at least one light guide is adapted to receive light from the condenser lenses. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers.{/mostip}7/11/2000

Parabolic and Spherical Multiport Illuminators for Light Guides
{mostip tooltip=1 title=Abstract}An optical system used in transmitting illumnation from a central source to a variety of remote locations, coupling the light originating from a lamp, or similar source, into a multiplicity of flexible macroscopic fibers. A heat containment barrier is disposed between the focusing lenses and the illumination source. The light source is surrounded by a wire cage, which forms a microwave cavity. The light source is rotated to facilitate a uniform plasma. A curve semi-spherical retro-reflector is provided to redirect light from the light source generally back through the lamp toward the focusing lenses. A mixing rod is coupled to each focusing lens.{/mostip} 12/2/1999 WO/1999/061945
AU8052698
BR9815875
CA2333535
EP1082629
IL139959D
JP2002517014T
MXPA00013038
SG77470

Portable Plastic Optical Fiber Bundle Cutter {mostip tooltip=1 title=Abstract}A hand-held plastic optical fiber bundle cutter is used for cutting the ends of plastic optical fibers in a bundle without smearing plastic cladding over newly cut ends of the fibers. The cutter has a blade, a blade mount, a hand-held heating unit, and a connection means. The blade has a cutting edge and a first and second surface. The blade mount holds the blade in place such that a majority of the blade first surface is in thermal contact with the blade mount and that at least a portion of the blade sharp edge extends beyond a leading edge of the blade mount. The connection means functionally connects the blade mount to the heating unit, thereby enabling a user of the cutter to hold the heating unit and cut the ends of the fibers with the blade.{/mostip} 8/5/1999 WO/1999/039551 5682448 Reflector and illumination system {mostip tooltip=1 title=Abstract}A light guide illumination system is provided for coupling light from an illumination source to a number of output "light guides", which are used for a variety of purposes, such as illuminating pools, spas, hazardous material zones, jail cells,

and other applications where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The illumination system employs an illumination reflector which has been customized to maximize the efficiency of light transmission between the illumination source, such as an arc lamp, and the cores of the output light guides. A method of fabricating the customized illumination reflector includes mapping the radiation patterns of the particular illumination source to be utilized, creating a database of those radiation patterns, and utilizing the database to generate an optimal illumination reflector configuration. The computer-generated reflector will virtually always be a non-conic section, because the illumination source is not ideal.{/mostip}10/28/1997

5832151 Reflector and illumination system

{mostip tooltip=1 title=Abstract}An optical pipe illumination system is provided for coupling light from an illumination source to a number of output "light pipes", which are used for a variety of purposes, such as illuminating pools, spas, hazardous material zones, jail cells, and other applications where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The illumination system employs an illumination reflector which has been customized to maximize the efficiency of light transmission between the illumination source, such as an arc lamp, and the cores of the output pipes. A method of fabricating the customized illumination reflector includes mapping the radiation patterns of the particular illumination source to be utilized, creating a database of those radiation patterns, and utilizing the database to generate an optimal illumination reflector configuration. The computer-generated reflector will virtually always be a non-conic section, because the illumination source is not ideal.{/mostip} 11/3/1998 WO/1997/043673 Reflector and Illumination System {mostip tooltip=1 title=Abstract}A compact light guide illumination system is disclosed. Light from an illumination source is reflected by dual reflector into a hot mirror. The hot mirror is adapted to deflect the ultra-violet and/or infrared radiation components of the incident light away from the hot mirror, while allowing passage of the other visible components of the incident light through the hot mirror. A fan and air deflector assembly circulates air over the hot mirror and over other optical components, such as the homogenizer lens assembly, to thereby provide efficient heat management and dissipation capability to the light guide illumination system.{/mostip} 9/11/1998WO/1998/039675

5661828

Reflector for Illumination System

{mostip tooltip=1 title=Abstract}A hollow light guide illumination system is provided for coupling light from an illumination source to a hollow light guide, which is used for a variety of purposes, such as tunnels, hallways, and large rooms where direct lighting is dangerous, difficult to maintain, or subject to vandalism. The illumination system employs an illumination reflector which has been customized to maximize the efficiency of light transmission between the illumination source, such as an arc lamp, and the core of the hollow light guide. A method of fabricating the customized illumination reflector includes mapping the radiation patterns of the particular illumination source to be utilized, creating a database of those radiation patterns, and utilizing the database to generate an optimal illumination reflector configuration. The computer-generated reflector will virtually always be a non-conic section, because the illumination source is not ideal.{/mostip} 8/26/1997 WO/1997/043674 Remote Lighting Design System {mostip tooltip=1 title=Abstract}A lighting design system for selecting non-traditional and traditional lighting by at least one remote user via electronic data transmission connection, preferably via the Internet, from at least one remote computer with an application server provider (ASP) having a server computer and general lighting software, fiber optic lighting software, and business support software installed on at least the server computer for permitting at least one remote user to access the software. The at least one remote computer includes a display device for displaying a series of interconnected windows presented by the software. The fiber optic lighting software includes algorithms and calculations for automatic conversion of units of an amount of light from Watts to lumens and vice versa thereby enabling the at least one remote user to consider lighting designs in traditional and non-traditional lighting without performing manual calculations. Notably, live links are embedded in the software and displayed on at least one remote screen for at least one remote user of the system, whereby selection fo the live links by the remote user connects the remote user to a window presented on the remote screen displaying detailed product specifications and information provided by a manufacturer of products represented by the live links.{/mostip}9/20/2001

WO/2001/069124

Segmented Reflector for Coupling an Extended Illumination Source to N Fiber Elements {mostip tooltip=1 title=Abstract}An optical fiber illumination system comprises a segmented reflector that efficiently couples energy from a lamp into a plurality of optical fibers. The segmented reflector offers the ability to improve the coupling efficiency by utilizing the cross-sectional area and numerical aperture of more than one optical fiber at the output of a reflector. Also this reduces the energy collected by a single fiber, and can be useful in preventing damage created by the source intensity. In practice, a source lamp is placed along a reflector axis. The reflector is specifically designed for a particular style and type of lamp, and is designed to collect as many rays from that lamp as possible.{/mostip} 8/5/1999 WO/1999/039134

EP1023557

6208782 Segmented Reflector for Coupling an Extended Illumination Source to N Fiber Elements

{mostip tooltip=1 title=Abstract}An optical fiber illumination system comprises a segmented reflector that efficiently couples energy from a lamp into a plurality of optical fibers. The segmented reflector offers the ability to improve the coupling efficiency by utilizing the cross-sectional area and numerical aperture of more than one optical fiber at the output of a reflector. Also this reduces the energy collected by a single fiber, and can be useful in preventing damage created by the source intensity. In practice, a source lamp is placed along a reflector axis. The reflector is specifically designed for a particular style and type of lamp, and is designed to collect as many rays from that lamp as possible. In a preferred embodiment, the reflector comprises four segments. Each of the four segments forms a distinct focus. In this embodiment, a plurality of lightguides, preferably optical fibers, are placed at the output of the reflector, one each at each

focus of the respective reflector segments, with the longitudinal axis of each optical fiber substantially parallel to the axes of the reflector and the lamp. Assuming radial symmetry, each of the four fibers will collect substantially the same amount of light energy, and will transmit this light energy to an end device or user.{/mostip}3/27/2001

5892867 Spherical Multiport Illuminator Optic Design for Light Guides

{mostip tooltip=1 title=Abstract}The inventive system, which is used in transmitting illumination from a central source to a variety of remote locations, efficiently couples the light originating from a lamp, or similar source, into a multiplicity of flexible macroscopic fibers. The combination of the several elements of the inventive system results in a very efficient transfer of the energy of the light source to the fibers. Light from the lamp is fed to a spherical configuration of ports, with each port having one or more flexible macroscopic fibers connected thereto.{/mostip} 4/6/1999 JP2001512579T WO/1998/034139

6196709 Trough Reflector and Lens Coupler for a Lightguide Illumination System {mostip tooltip=1 title=Abstract}A lightguide illumination system is disclosed for providing more improved and efficient technology for capturing light from an extended light source having a relatively high aspect ratio, and coupling that light into a plurality of lightguides. The inventive system functions by dividing the length of the extended light source into shorter segments, so that the aspect ratio of the light source can be more closely matched to the aspect ratio of the lightguide. In the preferred embodiment, a plurality of interleaved trough reflector segments are employed to segment the length of the light source. This enables the coupling efficiency of the total system to be greatly improved.{/mostip} 3/6/2001 EP1009947 WO/1999/039133

Note: AU=Australia, BE=Belgium, BR=Brazil, CA=Canada, CN=China, DE=Germany, EP=Europe, ES=Spain, IL=Israel, IN=India, JP-Japan, KR=Korea, MX=Mexico, NO=Norway, NZ=New Zealand, SG=Singapore, WO=Worldwide

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