Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 2958963 C 2020/03/24

(11)(21) **2 958 963**

(12) **BREVET CANADIEN**
CANADIAN PATENT

(13) **C**

(22) **Date de dépôt/Filing Date:** 2009/10/15

(41) **Mise à la disp. pub./Open to Public Insp.:** 2010/04/22

(45) **Date de délivrance/Issue Date:** 2020/03/24

(62) **Demande originale/Original Application:** 2 740 734

(30) **Priorité/Priority:** 2008/10/15 (US61/105,782)

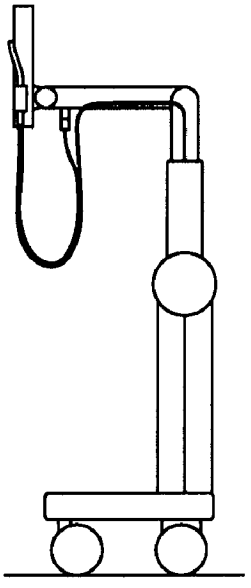
(51) **Cl.Int./Int.Cl.** ***A61B 18/20*** (2006.01),
A61B 18/22 (2006.01)

(72) **Inventeurs/Inventors:**
BOUTOUSSOV, DMITRI, US;
ATLAS, MIKHAIL, US

(73) **Propriétaire/Owner:**
BIOLASE, INC., US

(74) **Agent:** BORDEN LADNER GERVAIS LLP

(54) **Titre : DISPOSITIF DE TRAITEMENT A ENERGIE ELECTROMAGNETIQUE AVEC PLATEFORME A FONCTIONS MULTIPLES**
(54) **Title: SATELLITE-PLATFORMED ELECTROMAGNETIC ENERGY TREATMENT DEVICE**



(57) **Abrégé/Abstract:**
A satellite platform facilitates the dividing of a laser system into functional modules, and provides one or more of the functional module (e.g. articulated arm, handpiece, control panel) in a user's operational space while part, or a majority of the laser system may remain away from the user's operational space (e.g., on the wall, on the counter-top or at the walk-way).

ABSTRACT

A satellite platform facilitates the dividing of a laser system into functional modules, and provides one or more of the functional module (e.g. articulated arm, handpiece, control panel) in a user's operational space while part, or a majority of the laser system may remain away from the user's operational space (e.g., on the wall, on the counter-top or at the walk-way).

SATELLITE-PLATFORMED ELECTROMAGNETIC ENERGY TREATMENT DEVICE

CROSS REFERENCE TO RELATED APPLICATION

The present application is a divisional application of Canadian Patent Application No. 2,740,734 filed on October 15, 2009.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to medical devices and, more particularly, to energy-outputting tissue treatment devices.

2. Description of Related Art

A variety of laser systems have existed in the prior art. Solid state lasers can be advantageous in that they are compact, reliable for long-term use and easily replaced in the field. A solid-state laser system generally comprises a gain medium (e.g., laser rod) for emitting coherent light and a stimulation source for stimulating the gain medium to emit the coherent light. The gain medium in a solid state laser is a solid material usually having the form of a cylindrical rod. Flashlamps are typically used as stimulation sources, for example, but diodes may be used as well for the excitation source. The use of diodes for generating light amplification by stimulated emission is discussed in the book Solid-State Laser Engineering, Fourth Extensively Revised and Updated Edition, by Walter Koechner, published in 1996.

A typical conventional laser assembly may comprise a housing containing a laser module, which is connected by way of an optical connector to a trunk fiber. The optical connector can be constructed to facilitate attachment and removal of the trunk fiber to and from the housing, with the trunk fiber extending from the housing up to and through a handpiece. Furthermore, the trunk fiber can continue in an uninterrupted fashion from the handpiece and terminate at an energy output end of the trunk fiber.

SUMMARY OF THE INVENTION

A satellite platform is provided in a laser system for facilitating the parsing or dividing of the laser system into functional modules. According to a feature of the present invention, the satellite platform operates to provide one or more of the modules directly into (e.g., closer toward) a user's operational space.

In a typical implementation, the satellite platform pairs two or more of the functional modules for provision into the user's operational space (e.g., space closest to the user located between the user and a target). An exemplary embodiment includes pairing of two or more of the functional modules (e.g., two of the major components of the laser-system user interface, namely, the handpiece and/or the control panel) into a functional (e.g., separately functional and/or operable or controllable) combination.

The combination is provided by way of the satellite platform directly into the user's operational space, while part, all, or a majority of, the laser system may remain disposed away from the use's operational space (e.g., on a wall, on a counter-top or at a walk-way). A particular embodiment of the satellite platform is elucidated in the context of an articulated arm.

While the apparatus and method has or will be described for the sake of grammatical fluidity with functional explanations, it is to be expressly understood that the claims, unless indicated otherwise, are not to be construed as limited in any way by the construction of "means" or "steps" limitations, but are to be accorded the full scope of the meaning and equivalents of the definition provided by the claims under the judicial doctrine of equivalents.

Any feature or combination of features described or referenced herein are included within the scope of the present invention provided that the features included in any such combination are not mutually inconsistent as will be apparent from the context, this specification, and the knowledge of one skilled in the art. In addition, any feature or combination of features described or referenced may be specifically excluded from any embodiment of the present invention. For purposes of summarizing the present invention, certain aspects, advantages and novel features of the present invention are described or referenced. Of course, it is to be understood that not necessarily all such aspects, advantages

or features will be embodied in any particular implementation of the present invention. Additional advantages and aspects of the present invention are apparent in the following detailed description and claims that follow.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 shows a side elevational view of a modular laser according to a mobile configuration of the present invention;

FIG. 2 shows a side elevational view of a modular laser according to a wall-mounted configuration of the present invention; and

FIG. 3 shows a side elevational view of a modular laser according to a table-top configuration of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the invention are now described and illustrated in the accompanying drawings, instances of which are to be interpreted to be to scale in some implementations while in other implementations, for each instance, not. In certain aspects, use of like or the same reference designators in the drawings and description refers to the same, similar or analogous components and/or elements, while according to other implementations the same use should not. According to certain implementations, use of directional terms, such as, top, bottom, left, right, up, down, over, above, below, beneath, rear, and front, are to be construed literally, while in other implementations the same use should not. The present invention may be practiced in conjunction with various devices and techniques that are conventionally used in the art, and only so much of the commonly practiced process steps are included herein as are necessary to provide an understanding of the present invention. The present invention has applicability in the field of laser devices and processes in general. For illustrative purposes, however, the following description pertains to a medical laser device and a method of operating the medical laser device to perform treatments and surgical functions.

The laser system of the present invention can be readily/reversibly (e.g., non-destructibly, without deformation) configured and reconfigured (e.g., within about a minute

without the use of tools such as specialized drivers, pliers, drills or cutters), repetitively, an indefinite number of times, for use, interchangeably, as one or more of a stand-alone mobile cabinet, a wall-mounted unit, and a table-top device (e.g., depending on customer preference or particular requirement of a given office or procedure). Attachment or coupling of the laser-system base to a wheeled cart as in FIG. 1, to a wall or pole as in FIG. 2, or to a tabletop as in FIG. 3 can be accomplished using any known structure and technique, or any structure and technique which in light of this disclosure would be apparent, derivable, modifiable, or otherwise recognizable as suitable for achieving such attachment or coupling by one skilled in the relevant art (e.g., of medical devices, lasers, dental instruments, hardware, and/or housings for portable/configurable/detachable devices. Examples of such attachment structures are those commonly referred to as mounts or wall mounts, such as tongue-and-channel mounts which (following an initial setup) do not require bolts or pliers for rapid mounting and un-mounting of the system.

According to a feature of the invention, provided in a laser system is a satellite platform for facilitating the dividing, partitioning or breaking down (i.e., separating) of part or all of the laser system into a plurality of functional modules. The satellite platform separates one or more of the modules from the rest of the laser system and provides the separated one or more modules directly into (e.g., closer to the user than the module or modules would be without the dividing or partitioning) a user's operational space (e.g., space closer or closest to the user and/or located between the user and a target). During performance of a treatment on a target, the user's operational space may be, for instance, the space within an arm's length of the user and/or that located between the user and the target.

In a typical implementation, the satellite platform pairs two or more of the functional modules for provision into, or closer into, the user's operational space. An exemplary embodiment includes pairing of two or more of the functional modules (e.g., two of the major components of the laser-system user interface, namely, the handpiece and the control panel) into a functional (e.g., separately functional) combination.

The combination is provided by way of the satellite platform directly into the user's operational space, while part, all, or a majority of, the laser system may remain away from the use's operational space (e.g., at the walk-way, on the wall, or on the counter-top).

A particular embodiment of the satellite platform is elucidated in the context of an articulated arm, which by way of example and not limitation can be very similar to that used for components with conventional dental chairs.

The laser system can comprise an electromagnetic energy output device suitable for implementing treatment procedures on hard or soft tissue. The electromagnetic energy output device can be configured, for example, to be particularly suited for soft tissue cutting or ablating procedures, and also for decontamination, cleaning periodontal pockets, pain reduction, and biostimulation procedures, to name just an exemplary few.

With reference to the figures, embodiments of the current invention can comprise an electromagnetic energy output device having a system, such as a diode laser system.

The electromagnetic energy output device is provided in a modular form with a satellite platform and a base. The base end of the device can be provided in a mobile form such as on wheels as shown in FIG. 1, can be wall or pole mounted as shown in FIG. 2, or can be positioned on a table top as elucidated, for example, in FIG. 3. A housing and/or user-interface part of the device can comprise, for example, a display, such as a touchscreen, inputs and/or controls, and an electromagnetic energy source such as a laser.

According to an aspect of the present invention, part or all of the electromagnetic energy output device is embodied as a target-close electromagnetic energy emitting (e.g., lasing) device. An aspect of the present invention comprises moving forward, along a line of delivery system component locations, components of the target-close functional component. More particularly, one or more of the target-close functional components can be (e.g., are) configured to be positioned more forwardly so that they are disposed closer to the target, as compared to locations of components of typical prior-art systems. In other words, a substantial number of the elements of the target-close functional component, and in certain implementations all of the elements of the device, according to certain aspects of the present invention, be operatively disposed in a relatively close proximity to the target. While referenced herein as a functional component, it is intended that the energy source be interpreted to cover electromagnetic energy sources in general rather than just laser systems.

One feature of the present invention provides for the coupling of a target-close functional component to a satellite platform. Horizontal surface real-estate can be at a

premium during lasing procedures, so that movement (and subsequent repositioning) of the target-close functional component from proximity of such surfaces can free-up the surfaces for other tools or uses. One or more components of the target-close functional component may be, for example, mounted to or disposed on (as distinguished from just being coupled) the satellite platform. The one or more components of the target-close functional component may be mounted to or disposed on the satellite platform using one or more of fasteners, such as screws, clips, or straps, and/or gravity/friction. In certain embodiments, the one or more components, and in some implementations, all of the components, of the target-close functional component can be attached to a satellite platform of one or more of an operating table, an operating stand, an operating chair, and a wall.

Another feature of the present invention provides for the coupling of a target-close functional component to a satellite platform, which may comprise but is not limited to any one or more, in any permutation/combination, of the following items, none of which is to be considered equivalent, interchangeable or suggestive of the other: cable (e.g., vertically extending from a ceiling or other relatively high location), wire, bracket, articulated arm, telescoping link and pedestal. The satellite platform is embodied in the illustrated embodiment as an articulated arm.

When attached to a satellite platform (e.g., articulated arm), the target-close functional component does not, in certain implementations, require a surface or mount for placement on a counter or mounting on a wall. Accordingly, horizontal surfaces are conserved. Attachment of the target-close functional component can attenuate a number or length of required cables and/or other conduits, a fatigue of the user, an apprehension of a patient, an amount of clutter in a procedural area, and an amount of set-up time and/or clean-up time of a procedure.

One or more components of the target-close functional component may be mounted to or disposed on (as distinguished from just being coupled) the satellite platform (e.g., articulated arm). The one or more components of the target-close functional component may be mounted to or disposed on the satellite platform (e.g., articulated arm) with one or more of fasteners, such as clips, bands, snaps, grooves, pockets, cases, rings, hook and loop fasteners, mounts, or straps. Moreover, as compared to a conventional disposition of a

functional component on a horizontal support surface, it has been discovered that, in the context of coupling of the target-close functional component to the mentioned satellite platform (e.g., articulated arm), the of a user interface with fewer hard (physical) buttons and/or more of a display/software user interface (e.g., comprising more soft key and/or touch screen inputs, as compared to prior-art constructions) can facilitate a greater usability or versatility of the target-close functional component due to, for example, the less-restricting physical nature of the coupling. Similarly, as compared to a conventional functional component, the coupling of the target-close functional component to the mentioned satellite platform (e.g., articulated arm) can provide greater operability and efficiency when implemented with shorter cables and/or conduits/fibers.

A possible net result of the current invention's implementation of a target-close lasing system can be to at least partially, and in certain aspects, dramatically, enhance one or more of a safety (e.g., from a simpler assembly, less clutter on floor/table surfaces and/or less likelihood of user confusion/error), a versatility (e.g., movement/maneuverability of the device to/in or use of the device in more applications), and an efficiency (e.g., shorter fiber optic, less assembly/disassembly). Placement within/on the satellite platform (e.g., articulated arm) of certain functional components, such as laser modules, heat exchanging modules, etc., can reduce a length of the laser power delivery system and/or make better use of the available space. That is, the arm can be filled with functional components, an example being forming the laser in arm right behind the display to reduce the fiber length &/or make the fiber thinner or more flexible. In a further instance, a module that cools the laser can be positioned next to the laser. In yet a further instance, a length and design of the arm can be used for cooling of fluid. Such features can also make the overall system, or parts thereof, lighter and smaller.

Thus, the invention contemplates various approaches for forming the laser and/or its related sub-systems to be modular, functionally configurable and/or re-configurable according, for example, to current customer demand and a state of or specified technology from the manufacturer and/or other party. When the satellite platform is sold or licensed, it can be configurable according to customer requests (ex., an arm may include one, two or three lasers; and/or may include one, two, or three modules and/or a power supply can be a

certain dimension according to cost with smaller being more expensive wherein, for example, a base unit may contain a housing (e.g., rectangular) that is 3" deep housing as measured (extending) from the wall (left-to-right dimension in FIG. 2), 10" wide and 20" high. The depth can be the most critical dimension, allowing the entire assembly to rest or form and fit closely to the wall and not intrude into a working space. In the prior-art there tended not to be space in a typical dental office, for example, for a laser, and there tended to be large set-up time requirements for the laser – the present architectures of the invention address both by providing a space-conserving and time-saving (e.g., rapidly configurable) laser system.

Another possible net result of the implementation of a target-close lasing system according to the present invention can be to attenuate at least partially, and in certain aspects, dramatically, one or more of a manufacturing cost (e.g., from more compact, fewer or shorter components), an operational and/or maintenance cost (e.g., from delivery of energy over a smaller distance, resulting in fewer energy loses during use), and a subjective element experienced by the patient during a medical procedure (e.g., from more discrete and/or less formidable-looking equipment, as compared to typical prior-art systems). A typical power output may comprise, for example, 0.5 W to about 2.0 W, or more.

Any combination or permutation of components, systems and steps of or in connection with any target-close functional component described or referenced herein can be used or implemented, to any extent and in any combination or permutation, with any one or more of the components, systems and steps disclosed or referenced in US 2006/0240381, filed January 10, 2006. For example, fluid (e.g., atomized fluid particles) can be placed into an interaction zone in front of, for example, any of the output configurations disclosed herein for absorption of electromagnetic radiation and for subsequent expansion to impart an effect (e.g., mechanical cutting forces) onto a target.

Moreover, any one or more of the described or referenced fiber optic tip and distal end of a fiber optic may be provided with one or more of an air and a fluid (e.g., water) line as described, for example, in the referenced US 2006/0240381. An air and/or fluid (e.g., sterile water) source may be provided in the form of one or more receptacles (e.g.,

pressurized cartridges) which may be coupled with (e.g., attached to or housed in) one or more of the components described or referenced herein, such as a housing or handpiece.

Any combination or permutation of components, systems and steps of or in connection with any target-close functional component described or referenced herein can be used or implemented, to any extent and in any combination or permutation, with any one or more of the components, systems and steps disclosed or referenced in US 2007/0042315, filed June 26, 2006. For example, a visual feedback implement (e.g., camera) can be disposed in proximity to (e.g., on or within and/or at a distal part thereof) one or more of the described or referenced housing, handpiece, fiber optic tip, and distal end of a fiber optic. According to one example, any one or more of the described or referenced handpiece, fiber optic tip and distal end of the fiber optic may be provided with one or more of a water line and a visual feedback implement.

The housing and the output configuration and physically connected via the satellite link. Furthermore, according to another aspect of the present invention, one or more of the housing and the output configuration can be constructed with one or more of an application specific integrated circuit (ASIC) and a microprocessor. The microprocessor or microprocessors may be enabled, for example, for wireless communication of, for example, operating states and configurations of the target-close functional component. The wireless communications may be performed using, for example, Bluetooth® architectures and protocols, and/or the microprocessor or microprocessors may furthermore, or alternatively, be configured to transfer or upload data of, for example, previously acquired or real-time operating information.

With regard to FIGS. 1-3, these drawings are intended to be examples of implementations of various aspects of the present invention and are intended, according to certain but not all embodiments, to be to-scale. That is, according to certain implementations, the structures depicted in these figures may be interpreted to be to scale, but in other implementations they may not. In certain aspects of the invention, use of the same reference designator numbers in these drawings and the following description is intended to refer to similar or analogous, but not necessarily the same, components and elements. According to other aspects, use of the same reference designator numbers in these drawings

and the following description is intended to be interpreted as referring to the same or substantially the same, and/or functionally the same, components and elements.

In certain constructions of target-close functional components, for example, fiber optic tips, according to one feature of the present invention, can be formed (e.g., of solid glass) with radiation output orifices of 3-10 mm corresponding, for example, to photobiomodulation or low-level light therapy (LLLT) embodiments. Regarding low-level light therapy techniques, any combination or permutation of components, systems and steps of or in connection with any target-close functional component described or referenced herein can be used or implemented, to any extent and in any combination or permutation, with any one or more of the components, systems and steps disclosed or referenced in US 7,751,895, filed June 5, 2006.

According to certain implementations, laser energy generated by the modular laser is output from a power or treatment fiber, and is directed, for example, into fluid (e.g., an air and/or water spray or an atomized distribution of fluid particles from a water connection and/or a spray connection near an output end of the handpiece) that is emitted from a fluid output of a handpiece above a target surface (e.g., one or more of tooth, bone, cartilage and soft tissue). The fluid output may comprise a plurality of fluid outputs, concentrically arranged around a power fiber, as described in, for example, US 2005/0253517. The power or treatment fiber may be coupled to an electromagnetic energy source comprising one or more of a wavelength within a range from about 2.69 to about 2.80 microns and a wavelength of about 2.94 microns. In certain implementations the power fiber may be coupled to one or more of an Er:YAG laser, an Er:YSGG laser, an Er, Cr:YSGG laser and a CTE:YAG laser, and in particular instances may be coupled to one of an Er, Cr:YSGG solid state laser having a wavelength of about 2.789 microns and an Er:YAG solid state laser having a wavelength of about 2.940 microns. An apparatus including corresponding structure for directing electromagnetic energy into an atomized distribution of fluid particles above a target surface is disclosed, for example, in the below-referenced US 5,574,247, which describes the impartation of laser energy into fluid particles to thereby apply disruptive forces to the target surface.

By way of the disclosure herein, a laser has been described that can output electromagnetic energy useful to diagnose, monitor and/or affect a target surface. In the case of procedures using fiber optic tip energy, a probe can include one or more power or treatment fibers for transmitting treatment energy to a target surface for treating (e.g., ablating) a dental structure, such as within a canal. In any of the embodiments described herein, the light for illumination and/or diagnostics may be transmitted simultaneously with, or intermittently with or separate from, transmission of the treatment energy and/or of the fluid from the fluid output or outputs.

Corresponding or related structure and methods described in the following patents assigned to Biolase Technology, Inc., wherein such incorporation includes corresponding or related structure (and modifications thereof) in the following patents which may be, in whole or in part, (i) operable with, (ii) modified by one skilled in the art to be operable with, and/or (iii) implemented/used with or in combination with, any part(s) of the present invention according to this disclosure, that of the patents or below applications, and the knowledge and judgment of one skilled in the art.

Such patents include, but are not limited to US 7,578,622 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 7,575,381 (entitled Fiber tip detector apparatus and related methods); US 7,563,226 (entitled Handpieces having illumination and laser outputs); US 7,467,946 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 7,461,982 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 7,461,658 (entitled Methods for treating eye conditions); US 7,458,380 (entitled Methods for treating eye conditions); US 7,424,199 (entitled Fiber tip fluid output device); US 7,421,186 (entitled Modified-output fiber optic tips); US 7,415,050 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 7,384,419 (entitled Tapered fused waveguide for delivering treatment electromagnetic radiation toward a target surface); US 7,356,208 (entitled Fiber detector apparatus and related methods); US 7,320,594 (entitled Fluid and laser system); US 7,303,397 (entitled Caries detection using timing differentials between excitation and return pulses); US 7,292,759 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 7,290,940 (entitled Fiber tip detector apparatus and related

methods); US 7,288,086 (entitled High-efficiency, side-pumped diode laser system); US 7,270,657 (entitled Radiation emitting apparatus with spatially controllable output energy distributions); US 7,261,558 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 7,194,180 (entitled Fiber detector apparatus and related methods); US 7,187,822 (entitled Fiber tip fluid output device); US 7,144,249 (entitled Device for dental care and whitening); US 7,108,693 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 7,068,912 (entitled Fiber detector apparatus and related methods); US 6,942,658 (entitled Radiation emitting apparatus with spatially controllable output energy distributions); US 6,829,427 (entitled Fiber detector apparatus and related methods); US 6,821,272 (entitled Electromagnetic energy distributions for electromagnetically induced cutting); US 6,744,790 (entitled Device for reduction of thermal lensing); US 6,669,685 (entitled Tissue remover and method); US 6,616,451 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 6,616,447 (entitled Device for dental care and whitening); US 6,610,053 (entitled Methods of using atomized particles for electromagnetically induced cutting); US 6,567,582 (entitled Fiber tip fluid output device); US 6,561,803 (entitled Fluid conditioning system); US 6,544,256 (entitled Electromagnetically induced cutting with atomized fluid particles for dermatological applications); US 6,533,775 (entitled Light-activated hair treatment and removal device); US 6,389,193 (entitled Rotating handpiece); US 6,350,123 (entitled Fluid conditioning system); US 6,288,499 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 6,254,597 (entitled Tissue remover and method); US 6,231,567 (entitled Material remover and method); US 6,086,367 (entitled Dental and medical procedures employing laser radiation); US 5,968,037 (entitled User programmable combination of atomized particles for electromagnetically induced cutting); US 5,785,521 (entitled Fluid conditioning system); and US 5,741,247 (entitled Atomized fluid particles for electromagnetically induced cutting).

Also, the above disclosure and referenced items, and that described on the referenced pages, are intended to be operable or modifiable to be operable, in whole or in part, with corresponding or related structure and methods, in whole or in part, described in the following published applications and items referenced therein, which applications are listed

as follows: US 20090035717 (entitled Electromagnetic radiation emitting toothbrush and transparent dentifrice system); US 20090031515 (entitled Transparent dentifrice for use with electromagnetic radiation emitting toothbrush system); US 20080276192 (entitled Method and apparatus for controlling an electromagnetic energy output system); US 20080240172 (entitled Radiation emitting apparatus with spatially controllable output energy distributions); US 20080221558 (entitled MULTIPLE FIBER-TYPE TISSUE TREATMENT DEVICE AND RELATED METHOD); US 20080212624 (entitled DUAL PULSE-WIDTH MEDICAL LASER); US 20080157690 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 20080151953 (entitled Electromagnet energy distributions for electromagnetically induced mechanical cutting); US 20080125677 (entitled Methods for treating hyperopia and presbyopia via laser tunneling); US 20080125676 (entitled Methods for treating hyperopia and presbyopia via laser tunneling); US 20080097418 (entitled Methods for treating eye conditions); US 20080097417 (entitled Methods for treating eye conditions); US 20080097416 (entitled Methods for treating eye conditions); US 20080070185 (entitled Caries detection using timing differentials between excitation and return pulses); US 20080065057 (entitled High-efficiency, side-pumped diode laser system); US 20080065055 (entitled Methods for treating eye conditions); US 20080065054 (entitled Methods for treating hyperopia and presbyopia via laser tunneling); US 20080065053 (entitled Methods for treating eye conditions); US 20080033411 (entitled High efficiency electromagnetic laser energy cutting device); US 20080033409 (entitled Methods for treating eye conditions); US 20080033407 (entitled Methods for treating eye conditions); US 20080025675 (entitled Fiber tip detector apparatus and related methods); US 20080025672 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 20080025671 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 20070298369 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 20070263975 (entitled Modified-output fiber optic tips); US 20070258693 (entitled Fiber detector apparatus and related methods); US 20070208404 (entitled Tissue treatment device and method); US 20070208328 (entitled Contra-angel rotating handpiece having tactile-feedback tip ferrule); US 20070190482 (entitled Fluid conditioning system); US 20070184402 (entitled Caries

detection using real-time imaging and multiple excitation frequencies); US 20070104419 (entitled Fiber tip fluid output device); US 20070060917 (entitled High-efficiency, side-pumped diode laser system); US 20070059660 (entitled Device for dental care and whitening); US 20070054236 (entitled Device for dental care and whitening); US 20070054235 (entitled Device for dental care and whitening); US 20070054233 (entitled Device for dental care and whitening); US 20070042315 (entitled Visual feedback implements for electromagnetic energy output devices); US 20070014517 (entitled Electromagnetic energy emitting device with increased spot size); US 20070014322 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 20070009856 (entitled Device having activated textured surfaces for treating oral tissue); US 20070003604 (entitled Tissue coverings bearing customized tissue images); US 20060281042 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 20060275016 (entitled Contra-angle rotating handpiece having tactile-feedback tip ferrule); US 20060241574 (entitled Electromagnetic energy distributions for electromagnetically induced disruptive cutting); US 20060240381 (entitled Fluid conditioning system); US 20060210228 (entitled Fiber detector apparatus and related methods); US 20060204203 (entitled Radiation emitting apparatus with spatially controllable output energy distributions); US 20060142743 (entitled Medical laser having controlled-temperature and sterilized fluid output); US 20060099548 (entitled Caries detection using timing differentials between excitation and return pulses); US 20060043903 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); US 20050283143 (entitled Tissue remover and method); US 20050281887 (entitled Fluid conditioning system); US 20050281530 (entitled Modified-output fiber optic tips); US 20040106082 (entitled Device for dental care and whitening); US 20040092925 (entitled Methods of using atomized particles for electromagnetically induced cutting); US 20040091834 (entitled Electromagnetic radiation emitting toothbrush and dentifrice system); US 20040068256 (entitled Tissue remover and method); US 20030228094 (entitled Fiber tip fluid output device); US 20020149324 (entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting); and US 20020014855

(entitled Electromagnetic energy distributions for electromagnetically induced mechanical cutting).

Although the disclosure herein refers to certain illustrated embodiments, it is to be understood that these embodiments have been presented by way of example rather than limitation. For example, any of the energy outputs (e.g., lasers), any of the fluid outputs (e.g., water outputs), and any conditioning agents, particles, agents, etc., and particulars or features thereof, or other features, including method steps and techniques, may be used with any other structure(s) and process described or referenced herein, in whole or in part, in any combination or permutation as a non-equivalent, separate, non-interchangeable aspect of this invention. Corresponding or related structure and methods specifically contemplated, disclosed and claimed herein as part of this invention, to the extent not mutually inconsistent as will be apparent from the context, this specification, and the knowledge of one skilled in the art, including, modifications thereto, which may be, in whole or in part, (i) operable and/or constructed with, (ii) modified by one skilled in the art to be operable and/or constructed with, and/or (iii) implemented/made/used with or in combination with, any parts of the present invention according to this disclosure, include: (I) any one or more parts of the above disclosed or referenced structure and methods and/or (II) subject matter of any one or more of the following claims and parts thereof, in any permutation and/or combination. The intent accompanying this disclosure is to have such embodiments construed in conjunction with the knowledge of one skilled in the art to cover all modifications, variations, combinations, permutations, omissions, substitutions, alternatives, and equivalents of the embodiments, to the extent not mutually exclusive, as may fall within the spirit and scope of the invention as limited only by the appended claims.

CLAIMS:

1. An apparatus, comprising:

a satellite platform;

an output configuration coupled to the satellite platform and formed as a handpiece, an electromagnetic energy source actuatable by a user to output electromagnetic energy, a first circuit, a data transmitter and receiver, and a sterile output end constructed to deliver electromagnetic energy from the electromagnetic energy source to a target; and

a housing including, a second circuit, a graphical user interface having a display and one or more of user inputs and user controls, and a data transmitter and receiver that is configured to communicate one or more of operating states, configurations and real-time operating information with the first circuit, wherein the output configuration is hard-wired and physically connected to the housing; and

a wireless communication link between the housing and at least one of the satellite platform and the handpiece, wherein:

the apparatus is operable to output, simultaneously with the electromagnetic energy, fluid comprising water; and

wherein the apparatus comprises an atomizer and is configured to place atomized fluid particles into a volume along with electromagnetic energy whereby energy is imparted into the atomized fluid particles in the volume to thereby explosively expand the atomized fluid particles.

2. The apparatus as set forth in claim 1, wherein:

the apparatus is configured to output pulsed laser energy;

the output configuration comprises a touchscreen display; and

the output configuration comprises a fluid output configured to deliver fluid from a distal end of the output configuration.

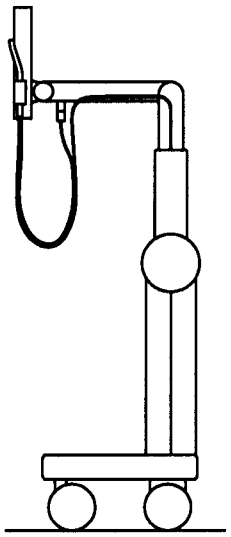


FIG. 1

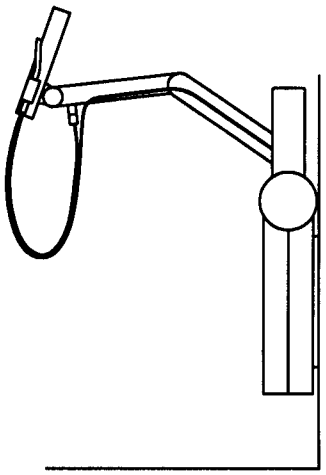


FIG. 2

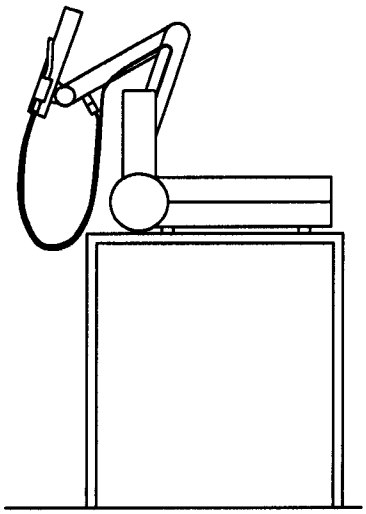


FIG. 3