Healthcare cum Optimal Illumination Device

FIELD OF INVENTION

The present invention relates to a healthcare cum optimal illumination device that makes full use of the electromagnetic radiation of different wavelengths (infra-red, visible light, ultra-violet) emitted from one or more light sources, such as a fluorescent lamp, to provide non-glaring illumination while at the same time, provide gentle air circulation and efficient air cleaning capabilities such as air filtration, ionization, sorption, electrostatic, photocatalysis and other technologies using one or more layers of treated fabric filter cover covering a modular lampshade.

BACKGROUND

Electric lamps are mainly used for illumination and decorating purposes since Thomas Edison invented the first incandescent bulb in 1879. Until now, other potentials of the lamp are not fully utilized.

The incandescent lamp is energy inefficient converting only 4-6% of electricity into illumination. The energy saving fluorescent lamp is much more efficient at energy usage, yet the major part of the electric energy (more than 75 %) is converted to heat energy, raising the indoor temperature of buildings, where these are used.

For human comfort and energy conservation, air heating system and air cooling system are installed in highly insulated buildings to maintain the desired temperature range of 21-25 degree centigrade and humidity range of 20-40% in winter and 40-60% in summer. The air heating systems and air cooling systems in modern buildings often create conditions for indoor air pollution which adversely affect indoor air quality. Other sources include synthetic building materials and furnishings, household cleaning products and personal care products, home appliances and office equipments, indoor plants, pets and pests, pesticides, garbage and decayed food, waste substances, and above all human activities and human beings themselves are sources that continuously producing indoor biological and chemical pollutants which affect the health and wellbeing of the occupants especially the young, the old and the sick, thus contributing

adversely to the well being and productivity of people living and working therein, increasing the burden of healthcare costs on individuals, families, employers and the state.

Many of the common diseases and sickness like allergies, asthma, cold, influenza, sinus, fever, sore throat, bronchitis, pneumonia, tuberculosis, measles, chickenpox, eye and skin diseases, cancers, cardiovascular diseases are caused partly by airborne microbes like virus, bacteria, fungus, protozoa, spore, pollen, algae, dust mites danders and other biological and organic and inorganic chemical air pollutants. Current treatments like vaccination and taking drugs and antibiotics which are normally disease-specific and sometimes may not be very effective for various reasons and sometimes may have short term or long term harmful side effects. One main reason is that virus and bacteria may mutate and become resistance to some of the vaccines, drugs and antibiotics that are already used for many years and hence new products have to be formulated to destroy these drug resistance microbes to replace the existing products.

In modern cities and farms, outdoor air pollutants and indoor air pollutants consisting of dust particles, microbes, organic and inorganic substances, liquid droplets, odours and toxic gases from diverse sources are produced by man and nature continuously. We need clean air and proper lighting at appropriate, balance and non-toxic levels for healthy and productive indoor living.

It is desirable if indoor living environment such as residences, private and public buildings, offices, shopping malls, hospitals, school, factories, livestock housing, etc can have proper lighting and can reduce and control the concentration level of various kind air pollutants to non-toxic levels by capturing them by air filtration. It would be better if there is an invention which can effectively destroy, decompose, and dispose these harmful microbes, odours, toxic substances captured or trapped by the fabric air filters.

The inventor has also observed there is a new approach to combat some of these infectious diseases by reducing the various harmful microbes/pathogens to a non-toxic level through injuring, killing and decomposing them continuously with hydroxyl radical, for superoxide anion and other charged particles. The traditional use of essential oil from antimicrobial and aromatherapy properties can be incorporated into the inventive device using the heat produced to evaporate and diffuse the essential oil into the surrounding. It is desirable if two or more of these air cleaning technologies can be

selectively adapted for use in an step-by-step and integrative manner in an invention, for healthy and pleasant living.

With the objective of lowering energy costs, reducing the carbon footprint of the light source further, improving the well being of individuals and reducing healthcare costs for individuals, employers and the state, the inventor has come up with a novel and cost effective way to make optimal use of the light (being visible light, infra red and ultra violet radiation) from energy efficient light sources such as fluorescent lamp, UV lamp and LED lamp while achieving all the stated purposes of killing air borne harmful microbes, trapping them therein as well as removing fine and ultra fine particulates, aerosols, volatile and non-volatile chemicals with the use of a number of treated fabric filter cover for the inventive device is new and unique.

The inventor has creatively integrated the three basic functions of non-glaring illumination, air circulation and elimination of air borne virus and bacteria and other microbes and removal of odours, VOC and other airborne pollutants into a useful, stand-alone and innovative multi-function healthcare cum optimal illumination device working at atmospheric pressure and ambient temperature. Such an inventive device which is efficient in terms of using the entire range of electromagnetic radiation for the light source and promotes the physical and mental health and social well being of the people in its surrounding is new and unique.

It is also desirable that the inventive device can be modular in combination so that standard modular units of various shapes, sizes, designs, colors, materials can be joined together to form larger size lamps with large number of configurations. With such a modular approach, the inventive device is scalable, and flexible and therefore made to accommodate varying room size ranging from a small bedroom to the lobby of a hotel to even the interior of a shopping mall and other large buildings. With such a modular approach, the inventory requirements of standard modular units can be greatly reduced because of standard sizes and common parts.

It is also desirable if the shape of each standard modular unit is either slightly tapered/slanted or in symmetrical half-shaped so that they can be stacked together to minimize space/volume required during storage and transportation and saving in packaging and delivery which will also reduce the carbon footprint and resources required.

It is also desirable that the inventive device not only can be covered with various types of treated fabric filter cover for air clearing but also for deco-matching and with patterns which can be changed to keep up with festive occasions and moods of the people and also with changing trends in interior design, thereby would not become obsolete.

It is desirable if the inventive device uses the combined features of a selection of devices with proven air cleaning technologies, a selection of treated fabric filter cover with anti- microbial properties and air cleaning properties, all of which can be pre-set by the user from the said selection depending on the indoor air qualities to meet not only the physical health conditions of the users and at the same time improve the mental health and social well being of the users through control of lighting of various colours and brightness and with improvement of ambience through music and other audio-visual therapies and also with essential oils which have antimicrobial aromatherapeutic properties. The audio-visual devices will not only create sound and sight conditions to help relaxation, rest and sleep but can also stimulate and facilitate physical movements and social interaction such as dancing, singing, exercising, etc using various hardwares and softwares for various health problems and healthcare solutions.

PRIOR ART

There exist already many air purifiers, fans and light bulbs with air purifying property in the market.

There are prior art patents that use fabric filter treated with photocalytic materials together with UV radiation and fan positioned within enclosed casing to purifying air. United States patents 6,666,912 and 5,330,722 disclose stand-alone air cleaning apparatus. But they are not fabric lamps for illumination functions as well.

Prior art patents have also considered incorporation of air purifying properties into fluorescent bulbs. They coated the glass bulbs with photocatalytic materials but without the use of partially enclosed fabric lampshade as filter to capture the air pollutants and without the air circulation functions.

Prior art patents such as CN 2864975 have disclosed the use of ultraviolet light from a illumination coating of rare earth phosphor whose wavelength is between 280 – 400 nm, which is capable of transforming 7-deoxidation ergot cholesterol in the skin into vitamin D[3] or D[2].

Other prior art patents such as JP 9294817 has disclosed the features of air purification through ionization and use of biochemical rays and ultraviolet rays to refresh and promote the health of the user.

PROBLEMS OF PRIOR ART

Electric lamps are mainly used for illumination and decorating purposes since Thomas Edison invented the first incandescent bulb in 1879. Until now, other potentials of the lamp are not fully utilized.

The incandescent electric lamp is also quite wasteful in energy usage. The energy saving fluorescent lamp is more efficient at energy usage yet the major part of the energy is still converted to heat energy, raising the temperature of its surroundings.

Prior art appliances directed towards killing of virus and bacteria also exist. Prior art appliances directed towards removal of VOC and odors also exist. Prior art appliances for improvement of air quality similar exist.

It is desirable if an invention could creatively integrate these three kinds of products into a useful, stand-alone and innovative healthcare cum illumination device which is more energy efficient, cost effective, safe, flexible, environment friendly, save space, able to remain relevant to user's health and decor requirements, user-friendly and affordable.

OBJECTS OF THE INVENTION

These innovative healthcare optimal lamps not only (A) make optimal or full use of the electrical energy converted to radiation energy of different wavelengths (infra-red, visible light, ultra-violet) for non-glaring illumination but also (B) have, depending on the requirements of the users and with flexi-configuration / arrangement of various

standardized components of these optimal lamps, the capabilities to perform additional useful functions as follows:

1) Will circulate indoor air drawn through one or more layer(s) of treated fabric filter cover of the lampshade by:

(a) convection means using only the heat (infra-red radiation) produced by one or more energy efficient light bulb(s), and / or

(b) mechanical means by using one or more electric fan(s) to generate greater volume of air flow and also uses the heat energy produced by the electric fan(s) for air circulation.

2) Will improve indoor air quality (IAQ) by innovative improved and integrative applications of various proven air cleaning technologies in a flexible, efficient and cost effective manner to agglomerate, precipitate, capture, hold, decompose and dispose various kind of biological (living and dead organisms) and chemical (organic and inorganic substances) air pollutants such as particulates matters (PM) of various kinds and sizes (coarse > 2.5um, fine 2.5-0.1 um and ultra fine < 0.1 urn), volatile organic and inorganic substances, odors and toxic gases from diverse sources which can cause adverse health effects. Air cleaning takes place at the treated fabric filter cover surface as well as outside the lamp by attaching negative ion and plasma ionizers at the outlet of the optimal lamp to produce several millions of charged particle(s) per c.c. per second and emit them like shower or spray into the surrounding indoor air containing air pollutants. Air circulation and random Brownian diffusion generated by the healthcare lamp will spread and mix the highly unstable and reactive negative and positive ions with the air pollutants, especially the ultra fine and volatile substances which are difficult to filter even with HEPA filter causing them to be charged, attract oppositely, interact and form larger and heavier particles and clusters. The agglomerated air pollutants cluster will become too large and heavy to remain suspended. Eventually, it will precipitate from the air by gravitational force. Some falling particulates will be drawn by the gentle circulating airflow and be captured and decomposed by nano-TiO_2 photocatalyst coated on the treated fabric filter cover of the lamp activated by UV radiation from light source(s) when switched on.

3) Will improve health by increasing the negative ions concentration / level and also balance the excess positive ions which exist in many enclosed and insulated buildings with insufficient ventilation.

4) Will enhance the safety of the lamp by restricting access into the partially enclosed treated fabric filter cover lampshade with the use of safety mesh (on top) and wrapped round with treated fabric filter cover (on the sides). In the event of accident, the lampshade will prevent the breaking of the light bulb(s). If the light bulb(s) is(are) broken inside the lampshade, the treated fabric filter cover will hold the harmful broken bulb(s), provide protection against harm from live electric current and toxic materials like mercury especially for young children.

5) Will enhance the cleanliness and brightness of the light bulb(s) and the useful service life span of the electric fan(s) with the removal of dusts and other air pollutants by the air treated fabric filter cover lampshade.

6) Can be used as a versatile and aesthetic fixture that blend and match well with other home fixtures (e.g. curtains, furniture, carpet, etc.) with its wide varieties of designs, texture and colors. The treated fabric filter cover used can be taken off easily, washed and used again.

7) Can be used to enhance physical and mental health and mood with appropriate volatile antimicrobial and aromatherapeutic essential oils treatment by natural inhalation and absorption. Plant extracts put into cups/containers are placed next to light source(s) in the chasis at the upper outlet of the lamp. The warm convectional airflow will evaporate and disperse the volatile essential oils throughout the room,

8) The healthcare lamp can be standardized or customized to the requirements of the buyers. The use of specific combination of treated fabric filter cover could also improve the anti-viral, anti-bacteria, anti-odor and other air cleaning properties of the inventive device.

9) Can be made and used as healthcare light boxes for learning, music, singing, dancing, exercising, advertising and display devices with anti-microbial, aromatherapeutic and audio-visual properties.

10) Can be made and used as therapeutic relaxation, SAD and circadian devices to reduce stress, depression and anxiety and to improve mood, relaxation and sleep.

11) Can be made and used to exterminate insects, such as mosquito and fly in a non toxic manner with the use of aroma, radiation, carbon dioxide and indoor plants etc at the lower part of the healthcare lamp.

The innovative integration of these capabilities and technologies for healthy indoor living, which is sustainable and caring, is a flexi-open system and continuously flow process to be called SC Technologies and in short SC-Tec.

SUMMARY OF THE INVENTION

A first object of the invention is a holistic healthcare cum illumination device for interior use, said healthcare cum illumination device with the application of SC-Tec comprise of:-

> An electrical light source(s) connected by electric cable and on-off switch to an electric power source point;
>
> a lampshade consist of a modular frame for holding the electrical light source(s), ionizer(s) essential oil(s), fan(s) and other audio-visual gadgets and also for holding one or more layer(s) of treated fabric filter cover(s) which function as mechanical and electrostatic air filter(s) substrate, glare diffuser, noise absorber, microbe shield, UV radiation shield, safety shield, decorative finishes and display screen

is that the electrical light source(s) emitting visible light and invisible infra-red radiation and UV radiation is optimally used, with the visible light illuminating the surrounding, the infra-red radiation heating the air around the electrical light source(s) and the said hot air within the inventive device rising to form a convection current, said convention current drawing cool ambient air from the surroundings into the lower part of the inventive device to replace the warm air that had risen through the upper end of the inventive device. Harmful air pollutants, including virus, bacteria, spores, molds, pollens, and various pathogens, allergens, and other organic matters that are captured by the treated fabric filter cover coated with nano-

TiO_2. Upon exposure to UV radiation from the electrical light source(s), TiO_2, a semi-conductor type of photocatalyst produce strong oxidizing species such as hydroxyl radical (OH) and super oxide anion ions. These powerful oxidation processes break down organic hazardous matters into relatively innocuous molecules like carbon dioxide, water vapour and inorganic salts.

Preferably, the inventive device has additionally one or more electric fan(s) to produce a stronger air circulation and also utilizing the heat generated by the electric fan(s) to product convection airflow in the same direction.

A second object of the Invention is a holistic healthcare cum illumination device comprising

a modular frame with an opening at its top and having a safety mesh, coated with activated carbon and TiO_2, for the outflow of warm clean air from the treated fabric filter cover lamp;

a chasis connected to the safety mesh lower part, for housing one or more ionizers, light bulb(s) and essential oil container(s), and

a lamp shade cover formed from one or more layer(s) of treated fabric filter cover, function as outer layer of mechanical filter(s) and also as substrate for holding and bonding anti-microbial agent to capture and kill various microbes physically by stabbing and electrocution; and/or treat the outer treated fabric filter cover layer with biocides like zinc oxide ZnO and calcium hydroxide $Ca(OH)_2$ which can also remove acidic gases like NO_x, SO_x, HCl, CO_2, etc, chemically by neutralization.

a layer of treated fabric filter cover treated with activated carbon, to remove odors and ozone by adsorption and reduction

a layer of treated fabric filter cover having nano-TiO_2 photocatalytic material to destroy organic pollutants by oxidative decomposition to innocuous carbon dioxide, water vapor and mineraled salt ;

Preferably, the chassis also hold one or more containers of essential oils.

Preferably, the inventive device has one or more electrical light sources which is a fluorescent lamp or a Light Emitting Device (LED) or incandescent lamp or High Intensity Discharge (HID) lamp.

Preferably, the inventive device has one or more air circulation units to produce a stronger convention current to draw in ambient air from the surrounding into a layer of treated fabric filter cover treated with anti pollutant properties so that that air borne pollutants are drawn through the layer of treated fabric filter cover and are caught and held by the said treated fabric filter cover.

Preferably, the inventive device has one or more air circulation units to produce a stronger convention current to draw in ambient air from the surrounding into a layer of treated fabric filter cover treated with anti-odour properties so that that air borne odours are drawn through the layer of treated fabric filter cover and are caught and held by the said treated fabric filter cover.

Preferably, the inventive device has one or more air circulation units to produce a stronger convention current to draw in air borne bacteria and virus from the surrounding and through a base of the inventive device and are destroyed or killed by the UV light emitted by the lamp.

A third object of the invention for a healthcare cum illumination device for interior use is a healthcare cum illumination device comprising:-

An electrical light source;

a chassis for holding one or more electrical light sources, one or more ionizers and one or more containers for essential oils; the electrical light source and the chassis fitted below the safety mesh at the top of the inventive device;

a Photocatalytic Air Cleaner (PAC) said PAC enclosing the electrical light source within, and having one or more layers of treated fabric

filter cover wrapped around it, with the base plate fitted with an air circulation unit

characterized in that the electrical light source emit visible light, infra red light and UV light, said visible light illuminating the surrounding, said infra-red light heating the air around the inventive device, said hot air within the inventive device rising to form a convection current, said convention current

- evaporate and diffuse the essential oils, heated by the electrical light source, out of the inventive device to the surrounding;

- draws cool ambient air from the surroundings into the inventive device so that air pollutants, air borne virus and bacteria passes through the PAC, said UV light killing air borne virus and bacteria drawn into the inventive device and upwards through the inventive device and air borne pollutants and odors drawn through the said PAC are removed and trapped with the one or more layers of treated fabric filter cover and other air borne microbes are trapped and killed in the one or more layers of treated fabric filter cover.

Preferably, the base plate for a PAC has an electric fan for air circulation and a treated fabric filter cover coated with TiO_2 for photocatalytic oxidation to decompose air pollutants.

Preferably, the base plate for a PAC has one or more slots to house an electric fan, various audio-visual gadgets, programmable controller and other devices.

Preferably, the treated fabric filter cover for the inventive device is treated with anti-microbial properties and can be washed and cleaned of dead microbes.

Preferably, the treated fabric filter cover for the inventive device is treated with anti-odor properties and can be washed and cleaned of bad odors.

Preferably, the treated fabric filter cover for the inventive device is treated with anti-pollutants properties can be washed and cleaned of pollutants.

Preferably, the treated fabric filter cover for the inventive device is printed with designs to match the decor of the interior of a building.

Preferably, the treated fabric filter cover for the inventive device is printed with words and pictures to be used as advertisements, notices and signs or motivational messages.

More advantageously, the inventive device has one or more ionizing units.

Preferably, the ionizing unit is fitted into the chasis.

Preferably, the ionizing unit for the inventive device sterilizes the indoor air at ambient temperature is drawn in by the said air circulation unit and passes through the inventive device at atmospheric pressure.

Preferably, the ionizing unit for the inventive device ionizes the air, producing negative and positive ions which attracts air borne pollutants in the ambient air drawn in by the said air circulation unit, said pollutants being trapped in the one or more layers of treated fabric filter cover.

Preferably , the ionizing unit is negative ion ionizer.

Preferably, the ionizing unit is a plasma ionizer.

Preferably, the base plate for the inventive device has a plurality of slots spaced apart.

Preferably, the base plate has a slot for installation of a programmable controller.

Preferably, the base plate has a slot for installation of a MP3 or MP4 player and speakers.

Preferably, the base plate has a slot for installation of control means for operation of the lamp, the MP3 or MP4 player and speakers, microphones, ear-plugs and tuner.

Preferably , the control means is one or more switches.

Preferably, the control means is a programmable controller and a display panel.

More advantageously, the chassis for the inventive device is fitted with one or more light bulb and each of the bulb emits light of the same colour or emits light of different colours.

Preferably, the programmable controller for the inventive device is connected to the lamps and air circulation units to operate the lamps and air circulation units.

Preferably, the programmable controller for the inventive device is additionally connected to the MP3 or MP4 player and other audio devices.

Preferably, the programmable controller for the inventive device is additionally connected to the sources of essential oils.

Preferably, the programmable controller for the inventive device can be programmed to control the different colours of light emitted by the lamps and said colours can be synchronised with the MP3 or MP4 player and release of essential oils to introduce different ambience and atmosphere in the surroundings of the inventive device.

Preferably, the programmable controller for the inventive device controls the operation of the lamps, air circulation units, MP3 /MP4 player and release of essential oils using a radio frequency or an infra red device.

Preferably, the programmable controller for the inventive device controls the operation of the lamps, air circulation units, MP3 /MP4 player and release of essential oils, using a Bluetooth device.

Preferably, the programmable controller has a display panel so that the user can select various modes of working of the inventive device.

More advantageously, the modular frame for the inventive device is a cylinder, a sphere, a square, an oval, a rectangle, an oblong in circumference.

More advantageously, the modular frame for the inventive device is a cylinder, a cone , a hemisphere when viewed from the side.

More advantageously, the modular frame for the inventive device are combined to form inventive devices of different configurations and of various shapes and sizes.

Preferably, each of the modular frames of the same shape or size can be stacked into each other for storage and shipping purposes.

Preferably, the top of the modular frames has a protective safety mesh for safety purpose and as substrate for the coating of activated carbon and TiO_2.

Preferably, the inventive device is formed from combining a PAC at the lower part of the modular frames covered by one or more layers of treated fabric filter cover, two or more air circulation units and one or more ionizers, one or more essential oil containers and one or more electrical light sources all of which are housed or fitted onto the chasis connected below the safety mesh at the upper part of the modular frame.

Preferably, the inventive device can be placed on a table or a floor or suspended from a wall or from a ceiling of the interior of a building.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, its advantages, and the objects attained by its use, reference should now be made to the accompanying drawings. The accompanying drawings illustrate one or more embodiments of the invention and together with the description herein, serve to explain the workings and principles of the invention.

FIG. 1 is an illustration of a basic embodiment of the invention.

FIG. 2a and 2b show the Top View and Front View of the basic embodiment and FIG. 2c and FIG. 2d shows the essential components added to the basic embodiment of the invention.

FIG. 3a-1 and 3a-2 are illustration of a working embodiment of the invention with an upper frame and lower frame joint together with the lower frame containing a PAC.

FIG. 3b and 3c show the top view of the chasis and base place respectively.

FIG. 3d is an illustration of the PAC.

FIG. 4 is an illustration of another working embodiment of the invention show a pendant lamp with LED light source and Treated Deco-Fabric added.

FIG. 5 is an illustration of how the modular frames can be used to construct the inventive device for use in a large interior with more illumination, air circulation, air cleaning and also with anti-microbial aromatherapeutic and audio-visual effects.

FIG. 6 shows two variations of modular frames used to make two different working embodiments of the invention.

FIG. 7 shows various combinations of lamps used on the inventive device of the invention.

FIG. 8 shows various modular frame shapes of lamp shades used on the inventive device to build various configurations of the invention using standard common parts.

FIG. 9 shows various combinations of shape of modular frame components used to build various configurations of the inventive device of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is an illustration of a basic embodiment of the inventive device. FIG. 2 is an illustration of the essential features of the basic embodiment with chassis (20).

Referring to FIG. 1, the basic inventive device consists of these modules-

a chassis (20) for an electrical light source (26), being a fluorescent lamp;

a treated fabric filter cover (24) on a modular frame (12).

The modular frame (12) is shown in bold black lines and the dashed lines represents the layers of treated fabric filter cover (26) covering the modular frame (12). The arrows show the convectional air inflow through the treated fabric filter cover (26) and air outflow through the upper end of the inventive device.

Referring to FIG. 2a to FIG. 2e, the basic modules of inventive device are shown::-

FIG. 2a is a top view of a chassis (20) for an electrical light source (26) showing the safety mesh (28) connected to the modular frame (12) of a circular taper shape lamp

FIG. 2b is a side view of the modular frame (12) of a circular taper shape lamp

FIG. 2c is a top view of the chasis (20) of the modular frame (12)

FIG. 2d is a side view of the chasis (20) of the modular frame (12) with treated fabric filter cover (24)

The chassis (20) for the electrical light source (26) has one or more containers. The containers can be filled with essential oils or perfumed pieces or a mixture of different types of essential oils. The heat from the lamp will evaporate the essential oils allowing it to diffuse throughout the surroundings.

The chassis (20) has one or more ionizers (36) which product negative ions and positive ions. These charged particles or plasma will spread throughout the surrounding by air circulation and Brownian diffusion movement generated by the inventive device to clean the air outside the inventive device.

The PAC (10) consists of an electrical fan (44) connected to an opening of a base plate (22) at the top and a modular frame (12) at its bottom. An UV lamp (30) can be placed below the electric fan (44) which is fitted at the top of the base plate (22) of

the PAC (10). Preferably, the chassis (20) should be fitted at the top of the modular frame (12) for the essential oils to be vaporised into the surroundings. The PAC (10) at the bottom of the modular frame (12) has an opening for installation of an air circulation device and generate to movement of air. The base plate (22) has a number of slots (40) which can be fitted with numerous devices, as will be described later on.

The PAC (10) is wrapped air tight with one or more layers of treated fabric filter cover (24) to make it an effective air cleaning device. The modular frame (12) can be fitted with one or more layers of treated fabric filter cover (24) which not only acts as a lamp shade for aesthetic purpose but as a filter for air borne pollutants and as substrates for holding various air cleaning chemical/substances. In FIG. 1, a portion of the treated fabric filter cover (24) covering of the lamp shade is cut away to show the interior structure of the lamp housing fitted into the modular frame (12). It can be connected to another modular frame (12) to form a larger device. A few layers of treated fabric filter cover (24) is shown wrapped around the lamp shade. The layers of treated fabric filter cover (24) can be changed to suit the indoor air quality and the health requirements of users. The layers could include:-

a. a layer treated with anti-microbial agents to trap and kill microbes and capture coarse particulates.
b. a layer treated with bactericides like ZnO, CuO or $Ca(OH)_2$; to trap and kill bacteria and to neutralize acidic gases like CO_2, NO_x, SO_x, HCl, etc.
c. a layer treated with activated carbon, to remove odors and ozone
d. a layer having nano-TiO_2 photocatalytic material to oxide and decompose the trapped danders, V.O.C. and microbes upon radiation with UV light.

Although the inventive device can consist only of a single modular frame (12) which also acts as the lamp shade as shown in FIG. 1 and FIG. 2, a effective working embodiment of the inventive device is shown in FIG. 3.

Referring to FIG. 3a-1 and 3a-2, taking advantage of the modular method of fitting, another modular frame (12) is then placed over a first modular frame (12). The combined modular frames (12) will thus form the structure of a lamp shade. Due to

its length, an air circulation unit such as an electric fan (44), is included to build up a stronger stream of air currents flowing from the surroundings, through the base of the inventive device, and out through the top of the inventive device.

FIG. 3b shows a top view of the chassis (20), with sockets for lamps and containers for essential oils (42).

FIG. 3c shows a top view of the base plate (22). The base plate (22) is provided with more than one slots (40) to fit an electrostatic unit, a programmable controller (52), an air circulation unit, an audio unit (52) and other devices in accordance to user's requirements. The air circulation unit can be separately located at the top and bottom of the inventive device. It is preferred that if essential oils are used that the chassis (20) be situated at the top of the inventive device. This is because the heat from the electrical light source (26) will vaporise the essential oils which will then be lifted upwards and outwards from the inventive device due to the uprising convection current assisted by the electric fan (44) which is located at the lower part of the inventive device.

The electrical light source (26) such as a fluorescent lamp is connected by electrical wire to a source of electrical supply and has a programmable controller (52) to switch on or off the electrical supply to the electrical light source (26) and other devices, if fitted into the modular frame (12).

It is possible for each of the lamp shades to be fitted with different layers of treated fabric filter cover (24) for various functions so that with one or two layers for each modular frame (12), strong glare will be diffused to provide soft lighting for visual comfort.

Due to the modular nature of the inventive device, it is possible for the base plate (22) not to be fitted with any devices and merely be an opening, to allow air to flow through. Likewise, it is possible for the chassis (20) not to be fitted with two or more containers or two or more sockets for lamps. Therefore the modular approach of this inventive device makes it possible for the user to select:-

the type of devices to be fitted into the base plate (22);
the type and nature of lamps and the number of lamps;

the type of treated fabric filter covers (24) to be used as lamp shade covers;
the type of essential oils to be used;
the type of chemicals to be coated on the treated fabric filter covers (24);
the air filtration efficiency of the filter to be used;

all of which can be pre-selected or change according to the health requirements of the users and according to the nature of the surroundings.

Operation of the healthcare cum illumination device

Referring to FIG. 3d, the light source (such as an electrical florescent lamp) is switched on. With a programmable controller (50), the florescent lamp can be set to have the air circulation turned on for a period of time and the ionizing unit for another period of time while the lamp can be turned on indefinitely until switched off. The programmable controller (50) can be operated with a number of switches or buttons or with a display panel with a menu or even a touch screen with interactive menu.

When the fluorescent lamp is switched on, it gives out visible light, infra red light and ultra violet light. Since both visible light and infra-red light gives off heat too, the air surrounding the interior of the modular frame (12) is heated up. Hot air within the interior of the modular frame (12) rises through an opening at the top of the modular frame (12). As the hot air rises, it draws cooler ambient air from the surroundings into the modular frame (12), going through the bottom of the modular frame (12) and through the treated fabric filter cover (24) of the modular frame (12). A convection current is thus formed, with air within the modular frame (12) continuously heated, said hot air rising to the top of the modular frame (12) and drawing cooler ambient air through the treated fabric filter cover (24) of the modular frame (12) and through the lower end of the modular frame (12). A stronger convection current would be produced with the use of an air circulation unit.

Depending on the type of air cleaning devices, the type of treated fabric filter cover (24) used as modular frame (12), the inventive device fitted with ionizers (46) will improve indoor air quality (IAQ) in a flexible, efficient and cost effective manner to agglomerate, precipitate, capture, hold, decompose and dispose various kind of

biological (living and dead organisms) and chemical (organic and inorganic substances) air pollutants such as particulates (PM) of various sizes (coarse > 2.5um, fine 2.5-0.1 um and ultra fine < 0.1 urn), volatile organic and inorganic substances, odors and toxic gases from diverse sources which can cause adverse health effects.

Air cleaning takes place at the treated fabric filter cover (24) as well as outside the lamp by attaching negative ion and plasma ionizers at the outlet of the optimal lamp to produce several millions of charged particle(s) per c.c. per second and emit them like shower or spray into the surrounding indoor air containing air pollutants. Air circulation and random Brownian diffusion generated by the healthcare lamp will spread and mix the highly unstable and reactive negative and positive ions with the air pollutants, especially the ultra fine and volatile substances which are difficult to filter even with HEPA filter causing them to be charged, attract oppositely, interact and form larger and heavier particles and clusters. The agglomerated air pollutants cluster will become too large and heavy to remain suspended. Eventually, it will precipitate from the air by gravitational force. Some falling particulates will be drawn by the gentle circulating airflow and be captured and decomposed by the treated filtering treated fabric filter cover (24) of the lamp.

In operation, the inventive device will draw air through one or more layer(s) of treated fabric filter cover (24) (as filter) of the lampshade by:

(a) convection means using only the heat (infra-red radiation) produced by the light bulb(s), and / or

(b) mechanical means by using one or more air circulation units such as electric fan(s) (44) to generate greater volume of air flow.

The air is drawn through the layers of treated fabric filter cover (24) with anti microbial shield. Various kind of biological (living and dead organisms) and chemical (organic and inorganic substances) air pollutants such as particulates (PM) of various sizes (coarse > 2.5um, fine 2.5-0.1 um and ultra fine < 0.1 urn), volatile organic compounds (VOC), odors and toxic gases from diverse sources would go through the treated layers. Air cleaning takes place at the treated fabric filter cover (24) as well as outside the lamp by attaching negative ion and plasma ionizers at the outlet of the inventive device producing several millions of charged particle(s) per c.c. per second and emit them like

shower or spray into the surrounding indoor air containing air pollutants. Air circulation and random Brownian diffusion generated by the inventive device will spread and mix the highly unstable and reactive negative and positive ions with the air pollutants, especially the ultra fine and V.O.C causing them to be charged, attract oppositely, interact and form larger and heavier particles and clusters. The agglomerated air pollutants cluster will become too large and heavy to remain suspended. Eventually, it will precipitate from the air by gravitational force. Some falling particulates will be drawn by the gentle circulating airflow and be captured and decomposed by the treated fabric filter cover of the lamp.

Indoor air quality (IAQ) is therefore improved through this innovative and integrative applications of various air cleaning technologies in the PAC unit of the inventive device.

Since the inventive device is used indoors, in a space in offices and apartments, the inventive device would be able to reduce the amounts of virus, bacteria, odors, pollutants to a minimum non-toxic level, after which it is no longer cost effective to remove the remaining amount of virus, bacteria, odors and pollutants. Thus, the controller having been various settings for the operation of the ionizing unit and air circulation unit so that it would switch off the ionizing unit and air circulation unit once the setting for each of their time period has been reached.

Each layer of treated fabric filter cover (24) would also have a minimum level of efficacy due to usage of the chemicals used on the particular layer. Such settings are provided with usage instructions for the use of the layer of treated fabric filter cover (24). Once the period of minimum efficacy has been reached, the user can remove the treated fabric filter cover (24) from the lamp shade and wash it, e.g. the treated fabric filter cover (24) for trapping pollutants. Alternatively, the same treated fabric filter cover (24) is replaced e.g. treated fabric filter cover (24) for killing bacteria.

It can be seen that the entire spectrum of light produced by a fluorescent lamp is thus utilised to produce illumination and assist in the process of cleaning the air. The use of one or more layers of treated fabric filter cover (24) as a lamp shade cover together with the ionizer (46) together with the PAC (10) clean the surrounding air by getting rid of air borne virus, bacteria, pollutants and odors. The use of essential oils would positively enhance the air quality of the surroundings. It can

be seen that the inventive device is a fully functional healthcare device which makes use of the entire visible wavelength of the light given out by the electrical light source (26), to promote healthy living.

Two tests were carried out by an independent testing laboratory on an enclosed office room of floor area approximately 9 m^2 and room volume of approximately 25 m^2. In the test, bacteria and fungi were introduced with common airborne bacteria and fungi culture media for the first five minutes of test duration. Similarly, another test was conducted in the same room, with introduction of nicotine by burning a Marlboro type cigarette for the first five minutes of test duration.

The following results recorded for the first test:

Cumulative time (mins)	RSP (mg/m^3)	MOM (PELTS) (mg/m^3)	SIAQG (mg/m^3)
0	14.4	10 (Nuisance Particulates)	0.15 (for reference purpose only)
30	10.1		
60	5.4		
120	1.9		
180	0.73		
240	0.62		
300	0.43		
360	0.22		
420	0.08		

Remarks: Respirable Suspended Particulates (RSP) was introduced into the indoor environment with Malboro type cigarettes burning for the first 5 minutes of test duration.

MOM : Ministry of Manpower, Singapore

PELTS : Permissible Exposure Levels of Toxic Substances

SIAQG : Singapore Indoor Air Quality Guidelines

Cumulative time (mins)	VOC (ppm)	MOM (PELTS) (ppm)	SIAQG (ppm)
0	987	Acetone=750ppm Trichloroethylene=50ppm Isopropyl Alcohol=400ppm	3 (for reference purpose only)
30	521		
60	312		
120	198		
180	108		
240	76		
300	52		
360	23		
420	0		

Remarks: Nicotine was introduced into the indoor environment with Malboro type cigarettes burning for the first 5 minutes of test duration.

The following results recorded for the second test:-

Cumulative time (hrs)	TBC (CFU/m^3)	TFC (CFU/m^3)	SIAQG (CFU/m^3)
0	1110	420	TBC:500 TFC:500
1	440	210	
6	45	30	

Remarks: Both Bacteria and Fungi were introduced into the indoor environment with common airborne bacteria and fungi cultures media for the first 5 minutes of test duration.

TBC : Total Bacteria Count TFC: Total Fungi Count

Cumulative time (hrs)	Nicotine (mg/m^3)	OSHA/ NIOSH/ ACGIA (mg/m^3)
0	0.54	Acetone=750ppm Trichloroethylene=50ppm Isopropyl Alcohol=400ppm
1	0.03	
6	0.01	

Remarks: Volatile Organic Compounds (VOC) was introduced into the indoor environment with evaporation of mixed solution comprised of acetone, trichloroethylene and isopropyl alcohol for the first 5 minutes of test duration.

OSHA : Occupational Safety and Health Administration, US
NIOSH : National Institute for Occupational Health & Safety, US
ACGIA : American Conference Of Governmental Industrial Hygieniists, US

The test results showed that after four hours, the inventive device working in a confined space could substantially reduce the amount of bacteria, fungi, odors and pollutants in a span of four hours.

Fitting of a healthcare cum illumination device

The chassis (20) for the fluorescent lamp has one or more sockets for insertion of one or more lamps.

The base plate (22) contains additional slots (40) for installation of an electrostatic unit, a programmable controller (50), MP3 or MP4 player and speakers and even a radio. The electric fan (44) can be fitted into the opening of the base plate (22).
The modular frame (12) for the inventive device comes in a few standard shapes, such as cylindrical, conical and semi-spherical. By combining one or more of each shapes, various shapes and sizes of inventive device can be formed.

Depending on the size and height of the inventive device, a number of air circulation units could be fitted into the inventive. Also a plurality of fluorescent lamp, modular frames (12) and lamp shades can be assembled in various combinations to form many types of the inventive devices for large confined interior spaces like lobbies and halls.

Combinations of Modular Units

Due to the modular nature of the modular frames (12) and lamp shades, it is possible for the lamp shade to be fitted over the modular frame (12), making it a lamp shape without a base. It is possible that a few lamp shades and one or more modular frame (12) be arranged to form the inventive device, as illustrated later on.

FIG. 4 is an illustration of another working embodiment of the invention. This embodiment consists of an upper modular frame (12) and a lower modular frame (12)

with two electrical light sources (26) and the lamp shade covering the upper modular frame (12). The lamp shade is semi-hemispherical while the lamp stand is conical in shape. In this variation, the electrical light source (26) are two fluorescent lamps and a plate of LED (48).

FIG. 5 is an illustration of how the modular multi frames floor lamp can be used to construct a standing inventive device for use in a large interior.

FIG. 6 shows two variations of modular frames (12) used to make two different working embodiments of the invention.

FIG. 7 shows various combinations of lamps used on the inventive device of the invention.

FIG. 8 shows various shapes of modular frames (12) used on the inventive device to build various configurations of the invention using standard common parts.

FIG. 9 shows various combinations of shape of modular frame (12) used to build various configurations of the inventive device of the invention.

Selection of combinations of technologies for health and personal requirements of users

The inventive device can have various types of treated fabric filter cover (24) as treated fabric filter cover (24) cover for the lamp shades, according to the requirements and choice of the users.-.

a. a layer treated with anti-microbial agents; to trap and kill microbes and filter calcium hydroxide coarse particulates.
b. a layer treated with bactericide like ZnO, CuO or $Ca(OH)_2$; to trap and kill bacteria and also to neutralize acidic gases like CO_2, NO_x, SO_x, HCl etc.
c. a layer treated with activated carbon, to remove odors and ozone
d. a layer having nano-TiO_2 photocatalytic material to trap, hold, kill and decompose microbes and organic pollutants.

Since the lamp shade covers acts like "pull overs" for the lamp shapes, it can be wrapped around the modular frame (12). For additional layers of lamp shade cover to be added, the user would have to wrap the additional layer of lamp shade cover over the inner lamp shade covers, which are already wrapped around the lamp shade. The lamp shade covers are therefore selected by the users to meet the health concerns of users:-.

For clean air, and to remove air borne pollutants, the user may choose to use a combination of treated fabric filter cover (24) and an ionizer (46).

For bacteria free and germ free air, the user may choose to use a combination of treated fabric filter cover (24) treated with anti-microbial agents to trap and kill microbes and a second layer treated with bactericide; to trap and kill bacteria and neutralize acidic gases like CO_2, NO_x, SO_x , HCl etc. together with an ionizer (46).

For relaxation and to reduce stress, the user may choose an aromatherapeutic essential oil combined with different lights of soft colours and music (from the MP3 player installed in the lamp holder). He or she may sing or dance with the music

The above are just a few combinations how the inventive device can promote health. The combinations are too many to describe herein.

Scalability

The power of the inventive device in cleaning the air and improving air quality would depend on the location of the inventive device. If the inventive device is placed in a open interior space such as lobby, the power of the inventive device both in terms of lighting and cleaning air-borne microbes and removing air borne pollutants would be much higher. The inventive device can then be fitted with a few lamps and electric fans (44), connected together by several modular frames (12). The use of various combinations of modular frames (12) and lamp shades together with a number of lamps and electric fans (44) offer flexibility to the user as the inventive device consisting of several modular frames (12), lamps, electric fans (44)

and lamp shades could be constructed to ensure the inventive device is efficient in lighting and removing air borne viruses and bacteria and odors from the large volume of space. Such an inventive device is shown in FIG. 5 which is a tall inventive device standing on the floor. The same can be hung from the ceiling of the lobby of a building.

The various shapes and sizes would also enable the user to use the inventive device in spaces of varying dimensions ranging from very large inventive devices for use in a lobby of an apartment building or hotel to a lamp in a small room. If the inventive device is used in a large space, it would be fitted with more fluorescent lamps, and more air circulation units, and more ionizing units (46), to enable it to work effectively in the larger space.

Safety

The use of lamp shades and modular frame (12) will enhance the safety of the lamp by restricting access into the partially enclosed treated fabric filter cover (24) lampshade. In the event of accident, the lampshade will help to prevent the breaking of the light bulb(s). If the light bulb(s) is (are) broken inside the lampshade, the treated fabric filter cover (24) will hold the harmful broken bulb(s), provide protection against harms from live electric current and toxic materials like mercury especially for young children. Additional protection is through the use of a safety mesh (28) on top of the inventive device when necessary. The treated fabric filter cover (24) wrapped around the PAC (10) too also act to prevent the hands of children from accidentally being placed inside the inventive device.

Keeping with decor and fashion

The treated fabric filter cover (24) of lamp shade can be changed to fit the requirements of the user. For example the treated fabric filter cover (24) used can be treated with charcoal to absorb odors and germicide in a kitchen. If there is a flu epidemic the treated fabric filter cover (24) could include a viricide. Therefore the combination of treated fabric filter cover (24) could be changed according to users' needs. The use of changeable layers of treated fabric filter cover (24) means healthcare aspect of this inventive device is flexible and adjustable. The use of treated fabric filter cover (24)

would also allow users to remove and replace those treated layers which have been used up and no longer effective.

Adaptation for other uses

Although the treated fabric filter cover (24) is treated, the first and outermost treated fabric filter cover (24) layer can also be used as advertisement signage. The inventive device can have lamp shade covers which are not only treated but can be overprinted with advertisement or notices or motivational messages. Therefore the inventive device can also be used as healthcare light boxes for advertising, learning and display devices.

Programmable to synchronize operations of various devices

The programmable controller (50) would ensure the inventive device operates at an efficient and optimal level at all times.

Since the inventive device can be suspended from a ceiling or the wall. As such, a remote control is used to control the programmable controller (50). The remote control can be by infra red or radio signals or Bluetooth.

Other health benefits

A MP3 or music player with speakers, microphone, ear plug, etc can also be fitted into the inventive device.

Whether the inventive device is on or off, the inventive device can play music in the background or motivational and spiritual messages in meditation.

Since the inventive device can have a plurality of fluorescent lamps, the colour of the light given out can also be changed. Some of the fluorescent lamps can give out red colour, or blue colour or green colour and the colour patterns can be varied or programmed to suit the seasons or the change of light from dawn to dusk. Such use of colour lights can have an positive effect on the mental state of the users especially in colder climates.

Controls

The programmable controls (50) can be activated by a remote control using infra red or blue tooth. Such remote controls are useful when the inventive device is hung high up or out of reach.

A display panel may also be added for table size inventive devices so that the user can select various modes of working of the inventive device, such as:-

a. Normal Lighting in early evening; without the air circulation unit on.
b. Subdued lighting in the later part of the evening with different coloured lights and music and with air circulation unit and the ionizer (46) on.

The display panel would also allow the user to set the inventive device to operate certain features or lights during certain times of the day to reflect the outside environment or to simulate daylight conditions in winter.

With a programmable controller (50) and use of wired transmission or wireless transmission of signals, such as Wi Fi, a plurality of inventive devices could be installed in a building and connected through a computer communications network. In this manner, efficient use of the inventive devices not only in terms of lighting consumption but also usage of the other features of the inventive devices could be managed. For example all the features of the inventive devices in the lobby could be turned on to the maximum if the lobby is packed during peak hours and some inventive devices could be turned off during non-peak hours, all these by managing each inventive device through issue of instructions to each inventive device, through keying of instructions through a display console in a Personal Computer in a control room.

The above are again examples of how the modular nature of the inventive device can used.

ADVANTAGEOUS EFFECTS OF THE INVENTION

The Healthcare cum Optimal Illumination Device makes use of the entire spectrum of visible light, infra-red and ultra violet light emitted by a fluorescent lamp. It not only lights the interior space but improves the indoor air quality by removing air borne pollutants and microbes at the same time.

It can incorporate other therapeutic and circadian devices to further extend its health promoting properties.

Its modular properties and flexibility in the type, nature and even designs in the treated fabric filter cover (24) used to cover the modular frames (12) would ensure the invention remains relevant and useful for a long time.

CLAIMS

1. A healthcare cum illumination device for interior use, said healthcare cum illumination device comprising:-

an electrical light source (26);

a chassis (20) for holding the electrical light source (26); and

one or more modular frames (12) enclosed in one or more layers of treated fabric filter cover (24) treated with photocatalytic materials and antimicrobial materials, and with an opening at the top of the inventive device for air outflow,

characterized in that the electrical light source (26) emit visible light, infra red radiation and UV radiation, said visible light illuminating the surrounding with diffused and non-glaring lighting, said infra red radiation heating the air around the inventive device, said hot air within the inventive device rising to form a convection current, said convention current drawing cool ambient air from the surroundings into the electrical light source (26) inside the inventive device, said hot air within the inventive device rising to form a convection current, said convection current drawing cool ambient air from the surroundings into the inventive device through the treated fabric filter cover (24) so that air pollutants, including air borne microbes passes through one or more layers of treated fabric filter cover (24) are captured, held, injured, killed and decomposed as the air borne microbes are drawn into the inventive device through the treated fabric filter cover (24) and other air borne pollutants and odors drawn through the treated fabric filter cover (24) of the said inventive device are also removed by the said treated fabric filter covers (24), thereby resulting in energy optimization.

2. A healthcare cum illumination device as claimed in Claim 1, having one or more of electric fans (44) units fitted to the inventive device with energy optimization to produce a stronger air circulation for cleaning a greater volume of air.

3. A healthcare cum illumination device as claimed in Claim 1 or in Claim 2 having a Photocatalytic Air Cleaner ("PAC") (10) comprising:

a modular frame (12);

an ionizer (46) fitted in the chassis (20);

said modular frame (12) forming a lamp shade cover having one or more layers of treated fabric filter cover (24), including:-

a layer of treated fabric filter cover (24) with anti-microbial agents; to trap and kill microbes;

a layer of treated fabric filter cover (24) treated with calcium hydroxide to filter coarse particulates and to neutralize gases like CO_2, NO_x, SO_x, HCl, etc.

a layer of treated fabric filter cover (24) with activated carbon, to remove odors and ozone

a layer of treated fabric filter cover (24) having nano-TiO_2 photocatalytic material to break down organic matters and gases;

said lamp shade also having a safety mesh (28) fitted onto the top of the lampshade;

4. The chassis (20) for a healthcare cum illumination device as claimed in Claim 1 or Claim 2 or Claim 3 wherein the chassis (20) also hold one or more containers of essential oils (42).

5. The PAC (10) as claimed in Claim 3 further comprising a base plate (22), said base plate having a housing for an electric fan (44) and an UV lamp (30), and one or more slots (40) to house audio-visual and control devices, said modular frame (12) enclosed with an airtight treated fabric filter cover (24) (HEPA or sub HEPA), the fabric treated with photocatalytic materials.

6. A healthcare cum illumination device as claimed in any one of Claim 1 to 5 having more than one modular frame (12) wherein the PAC (10) forms a lower modular frame (12) for more filtration and redox detoxification by photocatalytic decomposition.

7. A healthcare cum illumination device as claimed in Claim 1, wherein the one or more electrical light sources (26) is a fluorescent lamp or a Light Emitting Device (LED) or incandescent lamp or High Intensity Discharge (HID) lamp.

8. A healthcare cum illumination device as claimed in any of the preceding Claims having one or more air circulation units to produce a stronger convention current to draw in ambient air from the surrounding into a layer of treated fabric filter cover (24) with anti pollutant properties so that the air borne pollutants are drawn through the layer of treated fabric filter cover (24) and are caught and trapped by the said treated fabric filter cover (24).

9. A healthcare cum illumination device as claimed in any of the preceding Claims having one or more air circulation units to produce a stronger convention current to draw in ambient air from the surrounding into a layer of treated fabric filter cover (24) with anti-odour properties so that that air borne odours are drawn through the layer of treated fabric filter cover (24) and are absorded and adsorbed by the sorbents coated on the said treated fabric filter cover (24).

10. A healthcare cum illumination device as claimed in any of the preceding Claims, having one or more air circulation units to produce a stronger convention current to draw in air borne bacteria and virus from the surrounding and through the PAC (10) and are destroyed, caught, killed, captured and decomposed by the UV light emitted by the UV lamp (30) onto the photocatalytic material coated on the treated fabric filter cover (24)..

11. A healthcare cum illumination device for interior use, said healthcare cum inventive device comprising:-

an electrical light source (26);

a chassis (20) for holding the electrical light source (26) and one or more sources of essential oils; the electrical light source (26) and the chassis (20) fitted near the top of the inventive device;

a PAC (10) placed at the lower frame of the modular frame (12), said PAC (10) enclosing an UV light source within, and having one or

more layers of treated fabric filter cover (24) wrapped around it as treated fabric filter cover (24), with the base plate (22) fitted with an air circulation unit

characterized in that the electrical light source (26) emit visible light, infra red and UV radiation, said visible light illuminating the surrounding, said infra red radiation heating the air around the inventive device, said hot air within the inventive device rising to form a convection current, said convention current

- lifts the essential oils, heated by the electrical light source (26) and the electric fan (44), out of the inventive device to the surrounding;

- draws cool ambient air from the surroundings into the inventive device so that air pollutants including air borne virus and bacteria are filtered through the PAC (10) inside the modular frame (12) said photocatalytic oxidation kill and decompose air borne virus and bacteria which are captured and held by the treated fabric filter cover (24) as ambient air is drawn into the inventive device and upwards through the inventive device and air borne pollutants and odors drawn through the said inventive device coated with sorbents.

15. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of preceding Claims, wherein the treated fabric filter cover (24) is treated with anti-bacteria properties can be washed and cleaned of dead bacteria, inorganic substances and any undecomposed pollutants.

16. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of the preceding Claims, wherein the treated fabric filter cover (24) is treated with anti-virus properties can be washed and cleaned of dead and undecomposed virus.

17. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of the preceding Claims, wherein the treated fabric filter cover

(24) is treated with anti-odor properties can be washed and cleaned of any undecomposed bad odors.

18. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of the preceding Claims, wherein the treated fabric filter cover (24) is treated with anti-pollutants properties, and said treated fabric can be washed and cleaned of any undecomposed pollutants.

19. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of the preceding Claims, wherein the treated fabric filter cover (24) is printed with designs to match the decor of the interior of a building.

20. The treated fabric filter cover (24) for a healthcare cum illumination device as claimed in any one of the preceding Claims, wherein the treated fabric filter cover (24) is printed with words and pictures to be used as advertisements, notices and signs or motivational messages.

21. A healthcare cum illumination device as claimed in Claim 1 or Claim 11, having one or more ionizers (46).

22. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, said ionizer (46) fitted onto the chassis (20) or the base plate (22).

23. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, wherein said ionizer (46) sterilizes the air as ambient air is drawn in by the said air circulation unit and passes through the inventive device.

24. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, wherein said UV light from the electrical light source (26) as well as said ionizer (46) ionizes the air, producing ions which attracts air borne pollutants in the ambient air drawn in by the said air circulation unit, said pollutants being trapped in the one or more layers of treated fabric filter cover (24).

25. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, which oxidizes free radicals in the ambient air thus improving the quality of the ambient air over a period of time.

26. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, wherein the ionizer (46) is an anion ionizer.

27. An ionizer (46) for a healthcare cum illumination device as claimed in Claim 21, wherein the ionizer (46) is a plasma ionizer.

28. A base plate (22) for a healthcare cum illumination device as claimed in Claim 3, wherein said base plate (22) has a plurality of slots spaced apart.

29. A base plate (22) for a healthcare cum illumination device as claimed in Claim 3, wherein said base plate (22) has a slot (40) for installation of a programmable controller (50).

30. A base plate (22) for a healthcare cum illumination device as claimed in Claim 3, wherein said base plate (22) has a slot (40) for installation of a MP3 or MP4 player and speakers.

31. A base plate (22) for a healthcare cum illumination device as claimed in Claim 3, wherein said base plate (22) has a slot (40) for installation of control means for operation of the lamp, the MP3 or MP4 player and speakers and the containers of essential oils (42).

32. The control means for a healthcare cum illumination device as claimed in Claim 31, wherein the control means is one or more switches.

33. The control means for a healthcare cum illumination device as claimed in Claim 31, wherein the control means is a programmable controller (50) and a display panel.

34. A chassis (20) for a healthcare cum illumination device as claimed in Claim 1, wherein the chassis (20) is fitted with one or more light bulbs and each of the light bulb emits light of the same colour or emits light of different colours.

35. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) is connected to the lamps and air circulation units to operate the lamps and air circulation units.

36. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) is additionally connected to the MP3 or MP4 player.

37. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) is additionally connected to the sources of essential oils.

38. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) can be programmed to control the different colours of light emitted by the lamps and said colours can be synchronized with the MP3 or MP4 player and release of essential oils to introduce different ambience and atmosphere in the surroundings of the inventive device.

39. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) controls the operation of the lamps, air circulation units, MP3 /MP4 player and release of essential oils using an infra-red device or an radio frequency device.

40. A programmable controller (50) for a healthcare cum illumination device as claimed in any one of Claim 35 to 40, wherein said programmable controller (50) is controlled by a hand held device using infra-red or Bluetooth or WiFi.

41. A programmable controller (50) for a healthcare cum illumination device as claimed in Claim 29, wherein said programmable controller (50) controls the operation of the lamps.

42. A programmable controller (50) for a healthcare cum illumination device as claimed in any one of Claim 35 to 40 having a display panel so that the user can select various modes of working of the inventive device.

43. A healthcare cum illumination device as claimed in Claim 1 or Claim 4, wherein the one or more modular frames (12) is a cylinder, a sphere, a square, an oval, a rectangle, an oblong in circumference.

44. A healthcare cum illumination device as claimed in Claim 1 or Claim 4, wherein the one or more modular frames (12) is a cylinder, a cone, a hemisphere when viewed from the side.

45. A healthcare cum illumination device as claimed in any of the preceding Claims, wherein the one or more modular frames (12) are combined to form inventive devices of different configurations and of various shapes and sizes.

46. A modular frame (12) for a healthcare cum illumination device as claimed in any of the preceding Claims, wherein each of the modular frames (12) of the same shape or size can be stacked into each other for storage and shipping purposes.

47. A modular frame (12) for a healthcare cum illumination device as claimed in any of the preceding Claims, wherein the top of the modular frame (12) has a safety mesh (28) for safety purpose.

48. A healthcare cum illumination device as claimed in any of the preceding Claims, formed from combining two or more modular frames (12) covered by two or more layers of treated fabric filter cover (24), two or more air circulation units and two or more ionizers (46), two or more chassis (20) and two or more electrical light sources (26).

49. A healthcare cum illumination device as claimed in any of the preceding Claims, wherein the inventive device is placed on a table or a floor or suspended from a wall or from a ceiling of the interior of a building.

HEALTHCARE CUM OPTIMAL ILLUMINATION DEVICE

FIELD OF INVENTION

The present invention relates to a multifunction healthcare cum optimal illumination device that makes full use of the electromagnetic radiation (infra-red, visible light, ultra-violet) emitted from any non-incandescent light source(s) fitted inside a frame enclosed by treated filter covers to provide non-glaring illumination with air circulation (enhanced by air circulator) and efficient air detoxification / purification by integrating into its system in a flexi-add-on manner various air cleaning capabilities such as air filtration, neutralization, ionization, sorption, electrostatic, photo-catalysis and the use of essential oils with anti-microbial and aroma-therapeutic properties while the attachment of an audio system for entertainment and social activities becomes an add-on feature of this multi task healthcare device. By this one invention that appeals to the users' seeing, smelling, breathing and hearing is created thereby an indoor environment where we can breathe in clean fragrant air, see and read in visual comfort, and listen and enjoy audio recordings altogether contributing positively to our health in line with the World Health Organization's definition (quote) "Health is a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity" (unquote).

BACKGROUND

Electric lamps are mainly used for illumination and decorating purposes since Thomas Edison invented the first incandescent bulb in 1879. Until now, other potentials of the lamp are not fully utilized.

The incandescent lamp is energy inefficient converting only 4-6% of electricity into illumination. The energy saving fluorescent lamp is much more efficient in energy usage, yet the major part of the electric energy (more than 75 %) is converted to heat energy, raising the indoor temperature of buildings where these lamps are used.

For human comfort and energy conservation, air heating system and air cooling system are installed in highly insulated buildings to maintain the desired temperature range of 21-25^{0}C and relative humidity range of 20-40% in winter and 40-60% in summer. The air heating systems and air cooling systems in modern buildings often create indoor air pollution conditions that adversely affect indoor air quality. Other sources of indoor air pollution include synthetic building materials and furnishings, household cleaning products and personal care products, home appliances and office equipment, indoor plants, fertilizers, pets and pests, pesticides, garbage and decayed food, waste substances, various human activities like smoking, cooking, coughing, spraying pesticide, etc. and even the human body is continuously producing biological and chemical pollutants.

In modern cities and farms, man and nature produce continuously outdoor air pollutants and indoor air pollutants consisting of dust particles, microbes, organic and inorganic substances, liquid droplets, odors and toxic gases from diverse sources. They affect adversely the health of the occupants especially the young, the old and the sick much to the detriment of the well-being and productivity of people living and working inside such places thereby increasing the burden of healthcare costs on individuals, families, employers as well as the state.

Many of the common diseases and sickness like allergies, asthma, cold, influenza, sinus, fever, sore throat, bronchitis, pneumonia, tuberculosis, measles, chickenpox, eye and skin diseases, cancers, cardiovascular diseases are caused partly by harmful airborne biological pollutants like virus, bacteria, fungus, protozoa, spore, pollen, algae, dust mites and by organic and inorganic chemical air pollutants. Current treatments like vaccination and the taking of drugs and antibiotics that are normally disease specific may not be very effective sometimes due to mutation by germs.

Hence, for healthy and productive indoor living, it is imperative to have clean air and proper lighting at appropriate, balance and non-toxic levels.

It is desirable for indoor living environment such as residences, private and public buildings, offices, shopping malls, hospitals, school, factories, livestock housing to have proper lighting and to reduce and control the concentration level of various kinds of harmful air pollutants to non-toxic levels by capturing and destroying them with various air cleaning technologies/capabilities that are already mentioned in the Field of Invention.

With the objective of lowering energy costs, reducing the carbon footprint of the light source further, improving the well-being of individuals and reducing healthcare costs for individuals, employers and the state, the inventor has come up with a novel, unique, useful and cost-effective way to make optimal use of the light (being visible light, infra-red and ultra-violet radiation) from energy efficient light sources such as fluorescent lighting, UV lighting and LED lighting while achieving all the stated purposes of killing air borne harmful microbes as well as removing fine and ultra fine particulates, aerosols, volatile organic chemicals with the innovative and effective use of a number of air cleaning technologies in the inventive device.

The inventor believes that it is desirable that the frames of the inventive device are modular and standardised so that standard modular units of various shapes, sizes, designs, colours, materials can be joined together to form various sizes of the inventive device with varying number of configurations. With such a modular approach, the inventive device is connectable, scalable, and flexible to accommodate varying room size ranging from a small bedroom to the lobby of a hotel, even the interior of a shopping mall and other large buildings. This approach enables the inventory requirements of standard modular units to be greatly reduced because of standard sizes and common parts.

It is also desirable that the treated fabric covers of the inventive device as a décor illuminator with air cleaning functions are easily changeable to match the décor of the place, the mood of the users and the theme of the occasions whereas for most ordinary lamps the lampshades are not changeable.

It is desirable that the inventive device caters for the physical health conditions of the users while at the same time improving their mental health and social well-being by the control of lighting of various colours and brightness, improvement of ambience through music and other audio-visual therapies plus essential oils which have anti-microbial and aroma-therapeutic properties to add fragrance to the surrounding atmosphere. The inventive device will not only provide clean air for healthy living but also creates sound, smell and sight conditions to help relaxation, rest and sleep. It can also stimulate and facilitate physical movements and social interactions such as dancing, singing, exercising, etc using various hardwares and softwares for various health problems and healthcare solutions.

PRIOR ART

There exist already many air purifiers, fans and light bulbs with air purifying property in the market.

There are prior art patents that use fabric filter treated with photo-catalytic materials together with UV radiation and fan positioned within enclosed casing to purifying air. United States patents 6,666,912 and 5,330,722 disclose stand-alone air cleaning apparatus. But they are not fabric lamps for illumination functions as well.

Prior art patents have also considered incorporation of air purifying properties into fluorescent bulbs. They coated the glass bulbs with photo-catalytic materials but without the use of partially enclosed fabric lampshade as filter to capture the air pollutants and without the air circulation functions.

Prior art patents such as CN 2864975 have disclosed the use of ultra-violet light from an illumination coating of rare earth phosphor whose wavelength is between 280-400 nm, which is capable of transforming 7-deoxidation ergot cholesterol in the skin into vitamin D[3] or D[2].

Other prior art patents such as J P 9294817 have disclosed the features of air purification through ionization and use of biochemical rays and ultra-violet rays to refresh and promote the health of the user.

PROBLEMS OF PRIOR ART

Electric lamps are mainly used for illumination and decorating purposes since Thomas Edison invented the first incandescent bulb in 1879. Until now, other potentials of the lamp are not fully utilized.

The incandescent electric lamp is also quite wasteful in energy usage. The energy saving fluorescent lamp is more efficient at energy usage yet the major part of the energy is still converted to heat energy raising the temperature of its surroundings but otherwise unutilised.

Prior art appliances directed towards killing of virus and bacteria also exist. Prior art appliances directed towards removal of V.O.C and odors also exist. Prior art appliances for improvement of air quality similarly exist.

It is desirable if an invention could creatively integrate these three kinds of products into a useful, stand-alone and innovative healthcare cum illumination device which is more energy efficient, cost effective, is safe, environment friendly, flexible and space saving, while it is able to remain relevant to user's health and decor requirements, and is user-friendly and affordable.

OBJECTS OF THE INVENTION

The innovative healthcare optimal device not only (a) makes optimal or full use of the electrical energy converted to radiation energy of different wavelengths (infra-red, visible light, ultra-violet) for non-glaring illumination but also (b) performs the following additional useful functions with flexibility to meet the individual needs of the users through flexi-add-on configuration / arrangement of various standardized components in the innovative system of the inventive device that:

1) Circulates indoor air drawn through one or more layer(s) of treated fabric filter cover of the inventive device by:

(a) Convectional means using only the heat (infra-red radiation) produced by one or more energy efficient light source(s), and / or

(b) Mechanical means by using one or more electric fan(s) to generate greater volume of air flow and also using the heat energy produced by the electric fan(s) for air circulation.

2) Improves indoor air quality (IAQ) by innovative and integrative applications of various proven air cleaning technologies in a flexible, efficient and cost-effective manner to agglomerate, precipitate, capture, hold, decompose and dispose various kinds of biological (living and dead organisms) and chemical (organic and inorganic substances) air pollutants such as particulates matters (PM) of various kinds and sizes (coarse > 2.5um, fine 2.5-0.1 urn and ultra fine < 0.1 urn), volatile organic and inorganic substances, odors and toxic gases from diverse sources which can cause adverse health effects.

3) Improves health by increasing the negative ions concentration / level in indoor air and also to balance the ratio of excess positive ions which exist in many enclosed and insulated buildings with insufficient ventilation.

4) Enhances safety as access into the inventive device is restricted with the use of safety mesh (on top) and treated fabric filter cover (on the sides) to further enclose it preventing the breaking of any light bulb(s) fixed inside it. If an accident does occur the light bulb(s) is (are) broken inside the inventive device, the treated fabric filter cover will hold the harmful broken bulb(s) and provides protection against harm especially for young children.

5) Enhances the cleanliness and brightness of the light bulb(s) and the useful service life span of the electric fan(s) with the capture and removal of dusts and other air pollutants in the inventive device by the treated fabric filter cover.

6) Blends and matches well with other home fixtures (e.g. curtains, furniture, carpet, etc.). The inventive device is hence a versatile and aesthetic fixture with its wide varieties of designs, texture and colors. The treated fabric filter cover can be taken off easily, washed and is useable again. Moreover, the use of specific combination of treated fabric filter cover also improves the anti-viral, anti-bacteria, anti-odor and other air cleaning properties of the inventive device.

7) Enhances physical and mental health of the user including his mood with appropriate volatile anti-microbial and aroma-therapeutic essential oil / plant extract treatment by natural inhalation and absorption. Plant extracts put into containers are placed next to light source(s) in the chassis at the upper outlet of the inventive device and the warm convectional airflow evaporates and disperses the volatile essential oils throughout the room. As such this therapeutic capability extends the functionality of the inventive device that can thus be used as a therapeutic device, for instance, as a SAD or a circadian device with the additional benefits of its add-ons that provide a pleasant ambience of clean indoor air, appropriate colourful lighting, fragrance and sound that an ordinary SAD or circadian device cannot do.

8) Standardizes for the majority of users and customization for the minority with special needs.

9) Functions as unique healthcare light boxes with anti-microbial, aroma-therapeutic and audio-visual properties for display purposes while illuminating and cleaning the indoor air of the premises where these boxes are located.

10) Functions as a multitasked space saving and costs saving organiser with its in-built infrastructure that enables the installation of various add-ons like ionizers, essential oils, audio system with MP3/MP4 player, speakers and other audio aids so that all these are centralised into one device.

The innovative integration of these capabilities and technologies for healthy indoor living is the invention's flexi-add-on system and continuous flow process named SC Technologies (in short SC-Tec) by the inventor as it is a sustainable and caring device.

SUMMARY OF THE INVENTION

This invention is a holistic healthcare cum optimal illumination device for indoor use and comprises the following:

1. An electrical light source(s) connected by electric cable, an on-off switch and a plug to an electric power source.
2. A modular frame with a chassis for holding the electrical light source(s), ionizer(s), essential oil(s); and it is also used for holding one or more layer(s) of treated fabric filter cover(s) functioning as mechanical and electrostatic air filter(s), substrate , glare diffuser, noise absorber, microbe shield, UV radiation shield, safety shield, decorative finishes and display screen.

The light source(s) emitting visible light and invisible infra-red radiation and UV radiation is optimally used, with the visible light illuminating the surrounding, the infra-red radiation heating the air around the light source(s) and the said hot air within the inventive device rising to form a convection current, said convention current drawing cool ambient air from the surroundings into the lower part of the inventive device to replace the warm air that has risen through the upper end of the inventive device. Harmful air pollutants, including virus, bacteria, spores, molds, pollens, and various pathogens, allergens, and other organic matters are captured by the filter covers coated with various air cleaning chemicals including photo-catalyst. Upon exposure to UV radiation from the light source(s), the photo-catalyst will produce strong redox reactions which will break down organic hazardous matters into relatively innocuous molecules like carbon dioxide, water and inorganic salt.

Preferably, a modular frame with an opening at its top and having a safety mesh, coated with activated carbon and photo-catalyst for the outflow of warm clean air from the inventive device;

Preferably, a chassis connected to the upper part of the frame for housing one or more ionizers, lighting source(s) and essential oil container(s), and

Preferably, one or more layer(s) of treated fabric filter cover functioning as mechanical filter(s) and also as substrate for holding and bonding anti-microbial agent to capture and kill various microbes physically by stabbing and electrocution; and/or treat the outer layer of filter cover with biocides like ZnO, CuO and $Ca(OH)_2$ which can also remove acidic gases like NO_x, SO_x, HCl, CO_2, etc, chemically by neutralization.

Preferably, a layer of treated fabric filter cover treated with zeolite and activated carbon to remove odors by adsorption and ozone by reduction

Preferably, the inventive device has one or more electrical light sources e.g. fluorescent lighting or a Light Emitting Device (LED) or High Intensity Discharged (HID) lighting or UV lighting.

Preferably, the inventive device has one or more air circulation units to produce a stronger and larger air current drawn in from the surrounding through one or more layer(s) of fabric filter cover treated with anti-pollutant properties so that air borne pollutants in the air current are caught and held by the said treated fabric filter cover.

Preferably, a chassis for holding one or more electrical light sources, one or more ionizers and one or more containers for essential oils; the chassis is fitted below the safety mesh at the top of the inventive device;

Preferably, a Photo-catalytic Air Cleaner (PAC) consisting of a frame with a UV light source fitted within it; it also has a base plate fitted with a fan on top of it. The frame is also enclosed by one or more layers of filter covers treated with photo-catalyst and /or other chemicals.

Preferably, the electrical light source emits visible light, infra-red light and UV light, said visible light illuminating the surrounding, said infra-red light heating the air in the cavity of the inventive device, said hot air within the inventive device rising to form a convection current, said convention current evaporates and diffuses the essential oils, heated by the electrical light source, out of the inventive device to the surrounding;

Preferably, the treated fabric filter cover for the inventive device can be washed with soapy water to remove un-decomposed air pollutants and it can be used again.

Preferably, the base plate for a PAC has one or more slots to house an electric fan, various audio-visual gadgets, programmable controller and other devices.

Preferably, the treated fabric filter cover for the inventive device is printed with designs to match the decor of the interior of a building.

Preferably, the treated fabric filter cover for the inventive device is printed with words and pictures to be used as advertisements, notices and signs or motivational messages.

Preferably, the inventive device has one or more ionizing units.

Preferably, the ionizing unit for the inventive device will produce millions of very active negative ions and positive ions which will collide with air pollutants that will

be charged and attracted oppositely. They will agglomerate into larger and heavier clusters and gravity will precipitate them in the surrounding air which will be drawn into the inventive device by the air circulation. Air pollutants in clusters will be trapped and decomposed at the one or more layers of treated fabric filter cover by photo-catalysis.

Preferably, the ionizing unit is a plasma ionizer.

Preferably, the ionizing unit is negative ion ionizer which can also be incorporated into the light source as a fusion unit.

Preferably, the base plate for the inventive device has a plurality of slots and connection points spaced apart.

Preferably, the base plate has a slot for installation of control means (one or more switches) for operating the device, the MP3 or MP4 player and speakers slotted therein, microphones, earplugs and tuner.

Preferably, the control means is a programmable controller, a remote control or a display panel.

Preferably, the chassis for the inventive device is fitted with one or more light sources and each of the light sources emits light of the same colour or emits light of different colours and different brightness.

Preferably, the programmable controller for the inventive device is connected to the light sources and air circulation units to operate the light sources and air circulation units.

Preferably, the programmable controller for the inventive device is additionally connected to the MP3 or MP4 player and other audio devices.

Preferably, the programmable controller for the inventive device can be programmed to control the different colours of light emitted by the light sources and said colours can be synchronised with the MP3 or MP4 player and release of essential oils to introduce different ambience and atmosphere in the surroundings of the inventive device.

Preferably, the programmable controller for the inventive device controls the operation of the light sources, air circulation units, MP3 /MP4 player using a radio frequency or an infra- red remote control device.

Preferably, the programmable controller for the inventive device controls the operation of the light sources, air circulation units, MP3 /MP4 player using a Bluetooth device.

Preferably, the programmable controller has a display panel so that the user can select various modes of working of the inventive device.

Preferably, the modular frame for the inventive device is a circle, an oval, a square, a rectangle, a pentagon, a hexagon, an octagon, a star when viewed from cross sections.

Preferably, the modular frame for the inventive device is a cylinder, a cube, an oblong, a cone, a hemisphere, a sphere or other shapes when viewed from the side.

Preferably, the modular frame of the same shape and size for the inventive device can be combined to form inventive devices of different configurations and of various shapes and sizes.

Preferably, each of the modular frames of the same shape or size can be stacked into each other for storage, packaging and transport purposes.

Preferably, the inventive device is formed from combining a PAC at the lower part with the upper modular frames covered by one or more layers of treated fabric filter cover, and having one or more ionizers, one or more essential oil containers and one or more electrical light sources all of which are housed or fitted onto the chassis connected below the safety mesh at the upper part of the modular frame.

Preferably, the inventive device can be placed on a table or the floor or suspended from a wall or from a ceiling of the interior of a building.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, its advantages, and the objects attained by its use, reference should now be made to the accompanying drawings. The accompanying drawings illustrate several embodiments of the invention and together with the descriptions herein, serve to explain the workings and principles of the invention.

FIG. 1 and FIG. 1a illustrate a basic embodiment of the invention consisting of a frame (12), a chassis (20), a light source (26) and a treated filter cover (24) enclosing the frame (12).

FIG. 2a and 2b show the Top View and Front View of the basic embodiment and FIG. 2c and FIG. 2d show two containers of essential oil (42) and two units of ionizer (46) added at the chassis (20) to the basic embodiment of the invention.

FIG. 3a-1 and FIG. 3a-2 are illustration of a working embodiment of the invention showing it as a table lamp with an upper frame and lower frame joined together by a base plate (22) with the lower frame containing a PAC.

FIG. 3b and FIG. 3c show the top view of the chassis (20) and base plate (22) respectively.

FIG. 3d is an illustration of a PAC fitted with a controller unit (50) and an audio unit (52).

FIG. 4 is an illustration of another working embodiment of the invention showing it as a pendant lamp with LED light source and treated deco-fabric added.

FIG. 5 is an illustration of another embodiment of the invention showing how the modular frames can be used to construct a taller and bigger floor lamp for use in a large indoor space with more illumination, air circulation, air cleaning and also with anti-microbial aroma-therapeutic and audio-visual effects.

FIG. 6 is an illustration of another embodiment of the invention showing how two standard modular frames can be used to make two different working embodiments of the invention.

FIG. 7 shows various combinations of standard modular frames are used to make the inventive device in different shapes.

FIG. 8 shows modular frames of various shapes are used to build various configurations of the inventive devices with standard common parts of the invention.

FIG. 9 shows various shape of modular frame components used to build various configurations of the inventive device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is an illustration of a taper shape modular frame. FIG. 1a is an illustration of a basic embodiment of the inventive device consisting of these basic components:

a modular frame (12) enclosed by a layer of treated fabric filter cover (24); and

a chassis (20) attached to the frame (12) is fitted with a light source (26);

The modular frame (12) is shown in bold black lines and the dashed lines represent the layers of treated fabric filter cover (26) covering the modular frame (12). The arrows show the convectional air inflow through the treated fabric filter cover (26) and air outflow through the upper end of the inventive device.

FIG. 2a is a top view showing the safety mesh (28) connected to the modular frame (12) of a circular taper shape inventive device;

FIG. 2b is a side view of the modular frame (12) of a circular taper shape inventive device;

FIG. 2c is a top view of the chassis (20) having three sockets/holders one of which is for light source (26) and two are for containers of essential oil (42);

FIG. 2d is a side view of the modular frame (12), enclosed by treated fabric filter cover (24), having a chassis (20) fitted with one light source (26), two containers (42) and two ionizers (42);

The containers can be filled with essential oils (42) or a mixture of different types of essential oils. The heat from the light source will evaporate the essential oils allowing it to diffuse throughout the surrounding.

The chassis (20) also has two units of ionizers (46) which produce negative ions and positive ions. These charged particles or plasma will spread throughout the surrounding by air circulation and Brownian diffusion movement generated by the inventive device to clean the air outside the inventive device. Although the inventive device can consist of a single frame device as shown in FIG. 2d, a more effective embodiment of the inventive device is shown in FIG. 3a-1.

FIG. 3a-1 is an illustration of an embodiment of the inventive device having two frames (12) in the form of a table lamp. A base plate (22) is fitted between the upper and lower modular frames (12). The upper modular frame of this embodiment is similar to the basic embodiment as described in FIG. 2d except that it now has three light sources (26) instead of having only one light source. The chassis (20) is fitted at the top of the upper modular frame (12) so that the two units of essential oil (42) can be heated by the three units of light sources (26) and be evaporated and diffused easily into the surrounding. The lower modular frame houses the photo-catalytic air cleaner PAC. It consists of an UV light source (30) fitted below the electric fan (44) which is disposed at the top of the base plate (22) which is connected to the lower frame and enclosed by one more layers of treated filter cover. The base plate (22) has an opening for installation of an electric fan (44) to generate higher volume of airflow for more effective air cleaning.

The base plate (22) has a number of slots (40) which can be fitted with several devices such as MP3/MP4 player, speakers, ear plug, timer, dimmer, programmable controller, etc. as flexi-add-on components depending on the requirements of the users. The modular frame (12) can be fitted with one or more layers of treated fabric filter cover (24) which not only acts as a lamp shade for aesthetic purpose but as a filter for air pollutants and also as substrates for holding various air cleaning chemicals/substances. In FIG. 1a, a portion of the treated fabric filter cover (24) is cut away to show the interior structure of the inventive device. The layers of treated fabric filter cover (24) can be changed to suit the indoor air quality (i.e. extent of cleaning required) and the health requirements of users. The layers can include:-

a. a layer treated with anti-microbial agents to trap and kill microbes and to capture coarse particulates;

b. a layer treated with biocides like ZnO, CuO or $Ca(OH)_2$ to trap and kill microbes like virus, bacteria, fungi, etc. and also to neutralize acidic gases like CO_2, NO_x, SO_x, HCl, etc. ;

c. a layer treated with activated carbon to remove odors and ozone;

d. a layer having photo-catalytic material to capture and decompose air pollutants like V.O.C., odors, microbes, etc. by strong redox reactions upon radiation with UV light;

e. a combination of the above.

Referring to FIG. 3a-1 and 3a-2, two units of modular frames (12) are combined to form a new embodiment of the inventive device as a taller structure. An electric fan (44) is fitted onto the base plate (22), positioned between the two frames, to produce a stronger stream of air currents flowing from the surrounding, through filter covers (24) of the lower frame of the inventive device, and with an upward centrifugal vortex airflow in the cavity of the upper frame powered mainly by the rotating blade of the fan and then out through the side (covered) and the top (open) of the inventive device. Air cleaning takes place at the surfaces of the treated filter covers (24) which captured the harmful air pollutants in the airflow.

FIG. 3b shows a top view of the chassis (20) with sockets/holders for three light sources (26) and two containers for essential oils (42). Preferably, the chassis (20) be situated at the top of the inventive device. Heat radiated from the light source (26) will evaporate the essential oils which will then be lifted upwards from the inventive device and diffused into the surrounding due to the strong uprising convection current assisted by the electric fan (44) which is located at the middle part of the inventive device.

It is possible for the modular frame of the inventive device to be enclosed with different layers of treated fabric filter cover (24) for various functions and that strong glare will be diffused to provide soft lighting for visual comfort.

Due to the modular and flexi-add-on nature of the inventive device, it is possible for the base plate (22) not to be fitted with any devices and merely be an opening to allow air to flow through. Likewise, it is possible for the chassis (20) not to be fitted with any ionizer or any container for essential oil. Therefore the modular and flexi-add-on approach of this inventive device makes it possible for the user to select:-

the type and number of add-ons to be fitted onto the base plate (22);

the type and the number of light sources (26);

the type and number of fabric filter covers (24) to be used as shade covers;

the type and number of essential oils (42) to be used;

the type of chemicals to be coated on the treated fabric filter covers (24);

the air filtration efficiency of the filter covers (26) to be used;

the type and the number of ionizers (46) to be used;

all of which can be pre-selected or changed according to the health requirements of the users and according to the conditions and toxicities of the surrounding.

Operation of the healthcare cum illumination device

When the fluorescent light source is switched on, it gives out visible light, infra-red radiation and ultra-violet radiation. The air around the light source (26) in the modular frame (12) is heated up and hot air in the cavity of the modular frame (12) expanses and rises up through an opening at the top of the inventive device. As the hot air rises, it draws cooler ambient air from the surroundings into the modular frame (12), going through the treated fabric filter cover (24) of the lower modular frame (12). A convection current is thus formed, with air within the modular frame (12) continuously heated, said hot air rising to the top of the modular frame (12) and drawing cooler ambient air through the treated fabric filter cover (24) of the lower end of the modular frame (12). A stronger air current is produced with the use of an electric fan (44). Air pollutants in the air current will be captured by the treated filter covers (24). The types of air cleaning chemicals used on the various layers of treated fabric filter cover (24) depend largely on the health conditions of the users and, to a great extent, the kinds of air pollutants usually present in the surrounding. They normally consist of various kinds of biological (living and dead organisms) and chemical (organic and inorganic substances) air pollutants such as particulates (PM) of various sizes (coarse > 2.5um, fine 2.5-0.1 urn and ultra fine < 0.1 urn), volatile organic chemicals, inorganic substances, odors and toxic gases from diverse sources which can cause adverse health effects.

Air cleaning takes place at the treated fabric filter cover (24) as well as outside the inventive device by attaching negative ion and plasma ionizers at the outlet of the device with each emitter producing several millions of charged particle(s) per c.c. per second and emit them like shower or spray into the surrounding indoor air filled with air pollutants. Air circulation and random Brownian diffusion generated by the inventive device will spread and mix the highly reactive negative and positive ions with the air pollutants, especially the ultra fine and volatile substances which are difficult to filter even with HEPA filter causing them to be charged, attract oppositely, interact and form larger and heavier particulates and clusters. The agglomerated air pollutants cluster will become too large and heavy to remain suspended. Eventually, it will precipitate and remove from the air by gravitational force. Some falling

particulates will be drawn by the gentle circulating airflow and captured by the treated fabric filter cover (24) of the inventive device.

In operation, the inventive device will draw air through one or more layer(s) of treated fabric filter cover (24) (as filter) by:

(a) convection means using only the heat (infra-red radiation) produced by the light source(s), and / or

(b) mechanical means by using one or more air circulation units such as electric fan(s) (44) to generate greater volume of air flow.

Indoor air quality (IAQ) is therefore improved through this innovative and integrative applications of various air cleaning technologies in the inventive device.

The inventive device installed indoors such as offices, apartments and other buildings, is able to reduce the amounts of virus, bacteria, odors, V.O.C. and other pollutants to a minimum non-toxic level, after which it is no longer necessary and not cost-effective to remove the remaining insignificant amount of virus, bacteria, odors and other pollutants. Thus, the pre-set controller switches off the ionizing unit and air circulation unit once the setting for each of their time period has been reached.

It can be seen that the entire spectrum of radiation produced by a fluorescent light source is thus utilised to produce illumination as well as assisting, together with the use of one or more layers of treated fabric filter cover (24), ionizer (46) and the PAC, in cleaning the surrounding air by getting rid of air borne virus, bacteria, pollutants and odors. It can be seen that the inventive device which makes use of the entire electromagnetic radiation given out by the electrical light source (26) with flexi-add-on of essential oils is a fully functional healthcare cum optimal illumination device that promotes healthy living in an energy efficient environment.

A simple prototype PAC was made to test the working of the inventive device for air cleaning without using ionizer and essential oil. The test device consists of a frame enclosed by a single layer of filter cover treated with nano-TiO_2 photo-catalyst and a fan with airflow 95 c.f.m. fitted on a base plate located at the top of the frame with a 25 watt fluorescent light source fitted in the cavity of the frame. Test was carried out by an independent accredited testing company at an enclosed office room of floor area approximately $9m^2$ and room volume of approximately $25m^3$.

The following results recorded for the first test:

Cumulative time（mins）	RSP (mg/m^3)	MOM(PELTS) (mg/m^3)	SIAQG (mg/m^3)
0	14.4	10 (Nuisance Particulates)	0.15 (for reference purpose only)
30	10.1		
60	5.4		
120	1.9		
180	0.73		
240	0.62		
300	0.43		
360	0.22		
420	0.08		

Remarks: Respirable Suspended Particulates (RSP) was introduced into the indoor environment with six Marlboro type cigarettes burning for the first 5 minutes of test duration.

MOM : Ministry of Manpower, Singapore

PELTS : Permissible Exposure Levels of Toxic Substances

SIAQG : Singapore Indoor Air Quality Guidelines

Cumulative time（mins）	VOC （ppm）	MOM（PELTS） （ppm）	SIAQG （ppm）
0	987	Acetone=750ppm Trichloroethylene =50ppm Isopropyl Alcohol=400ppm	3(for reference purpose only)
30	521		
60	312		
120	198		
180	108		
240	76		
300	52		
360	23		
420	0		

Remarks: Volatile Organic Compounds (VOC) was introduced into the indoor environment with evaporation of mixed solution comprised of acetone, trichloroethylene and isopropyl alcohol for the first 5 minutes of test duration.

The following results recorded for the second test:-

Cumulative time （hrs）	TBC（CFU/m^3）	TFC(CFU/m^3)	SIAQG (CFU/m^3)
0	1110	420	TBC:500 TFC:500
1	440	210	
6	45	30	

Remarks: Both Bacteria and Fungi were introduced into the indoor environment with common airborne bacteria and fungi cultures media for the first 5 minutes of test duration.

TBC : Total Bacteria Count TFC: Total Fungi Count

OSHA : Occupational Safety and Health Administration, US

NIOSH : National Institute for Occupational Health & Safety, US

ACGIA : American Conference Of Governmental Industrial Hygienists, US

The test results showed that after two to four hours, the prototype inventive device working in a confined space could substantially reduce the amount of bacteria, fungi, V.O.C and respirable suspended particulates (RSP) to reach international air quality standards/guidelines for industrial buildings and office buildings. A larger inventive device with more capabilities added will perform these tasks better in a shorter time.

Combinations of Modular Units

Due to the modular nature of the frames (12), they therefore can be standardized, connectable and scalable. Thus two or more frames (12) can be connected with each other to form scalable inventive devices of various configurations, shapes and sizes for more functions and higher efficiency as illustrated in FIG.4 to FIG. 9.

FIG. 4 is an illustration of another working embodiment of the invention. This embodiment is a pendant lamp consisting of an upper modular frame (12) and a lower modular frame (12) with three electrical light sources (26) and the treated filter covers enclosing the lower and upper modular frames (12) with an opening at the top. A semi-hemispherical frame is connected to the top of the upper modular frame for holding the suspending deco-fabric cover. In this variation, the light sources (26) are two fluorescent light bulbs disposed at the cavities of the two modular frames. A plate of LED lighting (48) is disposed at the bottom of the lower frame.

FIG. 5 is an illustration of how several standard modular frames are connected vertically to form a tall standing floor lamp which is another embodiment of the inventive device that is very cost-effective and efficient for use in a large indoor space.

It has larger cross-section and greater height, more fans and stronger airflow, further dispersion and collection of air, larger and more filter surfaces, more in-out cycles of continuous multi-stages air filtrations which will result in better capture and more thorough decomposition of air pollutants by photo-catalysis.

FIG. 6 shows two standard taper shape modular frames (12) are used to make two different working embodiments of the invention by having two different configuration / combination.

FIG. 7 shows the use of three kinds of standard modular frames are used to make seven different two-frames combination inventive devices of various shapes and sizes.

FIG. 8 shows various shapes of modular frames (12) in cross section to be used to build inventive devices of various configurations using standard common parts.

FIG. 9 shows the various shape of modular frames (12) are used to build various configurations of the inventive device of the invention.

Selection of combinations of technologies for health and personal requirements of users

The inventive device can use various kinds of material to make fabric filter covers (24), and treated with different air cleaning substances, for enclosing the modular frames of the inventive device according to the requirements and choice of the users.

a. a layer treated with anti-microbial agents to trap and kill microbes and to filter coarse particulates.

b. a layer treated with biocides like ZnO, CuO or $Ca(OH)_2$ to trap and kill virus, bacteria and other microbes and also to neutralize acidic gases like CO_2, NO_x, SO_x, HCl etc.

c. a layer treated with activated carbon to remove odors and ozone

d. a layer having nano photo-catalytic material to trap, hold and decompose microbes and organic pollutants by strong redox reaction with UV radiation.

e. a layer treated with combination of two or more of above.

The fabric filter cover functions/acts like "clothing /dress" for the inventive device and it is wrapped around the modular frame (12). For additional layers of cover to be added, the user would have to wrap the additional layer of cover over the inner covers, which are already wrapped around the frame. The fabric filter covers are usually selected by the users to meet their health and deco-matching concerns.

For clean air and to remove air borne pollutants, the user may choose to use a combination of treated fabric filter cover (24) and an ionizer (46).

For bacteria free and germ free air, the user may choose to use a combination of treated fabric filter cover (24) treated with antimicrobial agents to trap and kill microbes and a second layer treated with biocide to trap and kill bacteria and neutralize acidic gases like CO_2, NO_x, SO_x , HCl etc. together with an ionizer (46).

For relaxation and to reduce stress, the user may choose an aroma-therapeutic essential oil combined with different lights of soft colours and music (from the MP3 player installed at the base plate) to dance and / or sing along with the music.

The above are just a few combinations of the health promoting inventive device.

Scalability

Standardization and flexi-add-on approach in product design and assembly enables the scale up of the inventive device by expansion in size and improvement in performance. The use of several units of standard modular frames (12) joined together to form a bigger and taller structure which enables the installation of more units of light sources (26), and more units of electric fans (44), and more units of ionizers (46) and other components. In this way, the user can get a customized inventive device that suits his requirements for efficient lighting and effective removal of air pollutants such as virus, bacteria, mould, smoke, odors, V.O.C.s and other harmful airborne substances from the large volume of space he is in. Such an inventive device is shown in FIG. 5 which is an illustration of a tall standing floor lamp. The same can be hung from the ceiling of the lobby of a large building.

The various shapes and sizes also enable the user to use the inventive device of varying dimensions ranging from very large to smaller sizes for use in a lobby of an apartment building or hotel or in a small room. If the inventive device is used in a large space, it would be fitted with more units of bigger frames, larger filter covers, more fluorescent light sources, more electric fans and more ionizers (46) to enable it to work effectively in the larger space.

Safety

The use of fabric filter covers and modular frame (12) enhances the safety of the inventive device by restricting access into the enclosed treated fabric filter cover (2). In the event of accident, the inventive device will help to prevent the breaking of the light bulb(s). If the light bulb(s) is (are) broken inside the inventive device, the treated fabric filter cover (24) will hold the harmful broken bulb(s) providing, especially important for young children, protection against harm from live electric current and

toxic materials like mercury. Additional protection is through the use of a safety mesh (28) on top of the inventive device when necessary. The treated fabric filter cover (24) wrapped around the PAC too also acts to prevent the hands of children from accidentally being placed inside the inventive device.

Adaptation for other uses

Although the fabric filter cover (24) is treated, the outer layer fabric filter cover (24) of the inventive device can also be overprinted or painted with pictures, words, drawings, signs, photographs, and other graphic materials for the inventive device to be used as a light box for display, advertisement, signage, notices, learning / presentation visual aid . In this way, the users of this light box enjoy all the benefits of the inventive device conducive to working and learning in a clean air and fragrant fresh environment. This light box housed in the inventive device is thus unique.

Programmable to synchronize operations of various devices

The programmable controller (50) would ensure the inventive device operates at an efficient and optimal level at all times.

Since the inventive device can be suspended from a ceiling or the wall, a remote control is used to control the programmable controller (50). The remote control can be by infra- red or radio signals or Bluetooth.

Controls

A display panel may also be added for table size inventive devices so that the user can select various modes of working of the inventive device, such as:-

a. Normal Lighting in early evening; without the air circulation unit on.

b. Subdued lighting in the later part of the evening with different coloured lights and music and with air circulation unit and the ionizer (46) on.

The display panel would also allow the user to set the inventive device to operate certain features or lights during certain times of the day to reflect the outside environment or to simulate daylight conditions in winter.

With a programmable controller (50) and use of wired transmission or wireless transmission of signals, such as Wi Fi, a plurality of inventive devices could be installed in a building and connected through a computer communications network. In this manner, efficient use of the inventive devices not only in terms of lighting consumption but also usage of the other features of the inventive devices could be managed. For example all the features of the inventive devices in the lobby could be turned on to the maximum if the lobby is packed during peak hours and some features

of the inventive device could be turned off during non-peak hours, all these by managing each inventive device through issue of instructions to various components of the inventive device, through keying of instructions through a display console in a Personal Computer in a control room.

The above examples show how the modular frame and flexi-add-on nature of the inventive device can be operated that may also ensure the invention remains relevant and useful for a long time.

CLAIMS

What is claimed is:

1 A healthcare cum optimal illumination device comprising:
at least one frame (12);
at least one non-incandescent light source (26) disposed in a cavity of the frame (12), the light source (26) emitting infra-red radiation, visible light radiation, and ultra-violet radiation, said visible light radiation is used for illumination, while the said invisible infra-red radiation and the ultra-violet radiation are harnessed to improve indoor air quality; and
at least one layer of fabric filter cover (24), treated with substances of air cleaning properties and enclosing the frame (12), the treated filter cover (24) with an opening at the top where air in the frame (12) heated by the infra-red radiation flows out from the device and cooler ambient air surrounding the device is drawn through the enclosed filter cover (24) into the cavity of the frame (12) replacing the heated air that has flown out of the inventive device to form air circulation by convection means and to perform air filtration.

2 The healthcare cum optimal illumination device according to claim 1, wherein the filter cover (24) has one layer coated with anti-microbial agents, one layer treated with zinc oxide, copper oxide, or calcium hydroxide, one layer coated with activated carbon or zeolite, one layer coated with nano photo-catalyst, or the combination thereof to capture and remove air pollutants at surfaces of the filter cover (24).

3 The healthcare cum optimal illumination device according to claim 1 and claim 2 wherein different filter materials are used to make fibres of different thickness, length, and other chemical and physical properties and further make into fabric filters with different textures and finishing treatments according to customers' requirements.

4 The healthcare cum optimal illumination device according to claim 1 and claim 2 wherein the outer layer of filter cover (24) can be further printed with pictures, words, drawings, designs and can be used as healthcare light boxes for advertisements, displays, signage, notices, messages, learning and teaching visual aids and others.

5 The healthcare cum optimal illumination device according to claim 1, further comprising a chassis (20) disposed at the upper portion of the frame (12) with sockets / holders for disposing light sources (26), ionizers (46) and containers (42) for containing essential oils to improve indoor air quality outside the inventive device.

6 The healthcare cum optimal illumination device according to claim 5 wherein the ionizer (46) can be a plasma ionizer or an anion ionizer and the anion ionizer can be incorporated into the light source (26) as a fusion unit.

7 The inventive device according to claim 5 and claim 6 wherein the ionizers can increase the ions concentration in the enclosed indoor surrounding to appropriate level depending on requirements and it can also modify or rebalance the ratio of negative ions to positive ions in indoor air similar to that as existing in nature or any desirable ratio.

8 The inventive device according to claim 6 and claim 7 wherein each plasma ionizer can produce several millions of highly reactive positive ions and negative ions per c.c. per second like shower of electric charges that will collide and interact with the fine and ultrafine suspended particulates, including microbes. The opposite charges imparted by the positive ions and negative ions to the particulates will cause them to attract and agglomerate to form clusters. The larger and heavier cluster will precipitate from the air by gravity. When hit intensively and repeatedly by the highly reactive positive ions and negative ions, virus and bacteria in the air and on surfaces in the surrounding can be injured and even be killed. This electronic sterilisation/disinfection is helpful and good for our immune system and our health.

9 The healthcare cum optimal illumination device according to claim 5 further comprising at least one container (42) containing anti-microbial and fragrant essential oil disposed at the chassis 20. It will evaporate and diffuse by heat from the light source to disinfect and refresh indoor air outside the inventive device by bio-chemical means.

10 The healthcare cum optimal illumination device according to claim 1 further comprising a base plate (22) disposing between two frames (12) so that the base plate enables the inventive device to be connectable, scalable and facilitating flexi-add-on and multifunction capabilities. Base plate (22) has a cavity/opening in the centre and a plurality of connection points (23) and slots (40) spaced apart around the plate.

11 The healthcare cum optional illumination device according to claim 1 and claim 10 wherein two or more modular frame (12) can be joined together by the base plate (22) to form the inventive device in larger sizes and of different shapes and configurations.

12 The healthcare cum optimal illumination device according to claim 1 and claim 10 wherein the frames (12) is in taper / slant shape or cut-in-half sections so that they can be stacked on each other for the reduction of storage space, packaging, transport and other costs reduction and they can be connected for various configurations.

13 The healthcare cum optimal illumination device according to claim 10 further comprising an electric fan (44) disposed at the opening / cavity of the base plate (22) to enhance air circulation and air filtration by mechanical means. It creates a centrifugal vortex air flow in the cavity of the inventive device for effective air cleaning.

14 The healthcare cum optimal illumination device according to claim 10 further comprising an audio system (52) with MP3/MP4 player, speakers, microphone, earplug, etc., are disposed at one or more slot (40) of the base plate (22) enabling the installation of software for music, singing, dancing, exercise, meditation, yoga, inspiration messages, narration, poetry, lullaby and other recordings to induce relaxation, stress release, rest, sleep and other activities that contribute to the health and well-being of the users.

15 The healthcare cum optimal illumination device according to claim 10 further comprising a programmable controller (50) disposed at one of the slot (40) at the base plate (22) wherein the programmable controller (50) is connected and programmed to control the operation of the various multi-functions of the inventive device including the on-off device, light sources, ionizers, fans, audio system, timer, dimmer and other devices.

16 The healthcare cum optimal illumination device according to claim 1, further comprising a safety mesh (28) disposed at the top of the inventive device.

17 The healthcare cum optimal illumination device according to claim 1 further comprising one or more layers of fabric filter cover (24) enclosing the frame (12), except the top for air outflow, thereby enhancing the safety of the inventive device by restricting access into it. The filter covers also help to reduce the likelihood of breaking of the light bulbs in the inventive device in the event of accident.

18 The healthcare cum optimal illumination device according to claim 10 and claim 13, further comprising a photo-catalytic air cleaner (PAC) which includes an ultra-violet light source (30) disposes in the cavity of the frame (12) which is joined to the base plate (22) fitted with a fan (44) and is located at the top of the frame (22) which is enclosed by two or more layers of filter covers treated with nano photo-catalysts. When the inventive device is switched on, the electric fan (22) and the heat from the light source (30) will draw the ambient air into the cavity of the PAC through the enclosed filter covers and flow out the PAC through the fan (22). Air pollutants will be captured by the filter covers treated with photo-catalyst and will be decomposed by strong redox reactions when radiated by the UV light source (30). Those air pollutants that cannot be decomposed by photo-catalysis will be removed by taking off the dirty filter covers for washing with soapy water. After drying, the clean filter covers can be re-used.

19 The healthcare cum optimal illumination device according to claim 1, wherein the light source (26) includes several different kinds non-incandescent light sources capable of emitting light of different colours and brightness such as fluorescent lighting, LED lighting, HID lighting, UV lighting and others.

20 The healthcare cum optimal illumination device according to claim 1 and

claim 19 thus makes optimal / full utilization of all radiation emitted by the light source(s) by harnessing the unused invisible IR and UV radiation for air cleaning / detoxification to improve air quality for healthy living.