Feb. 19, 1935. C. A. LAISE 1,991,510

RADIATING APPARATUS

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Fig. 1.

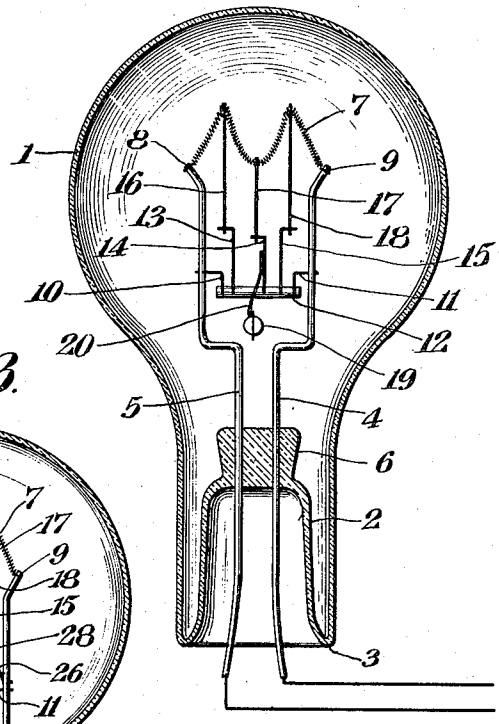


Fig. 3.

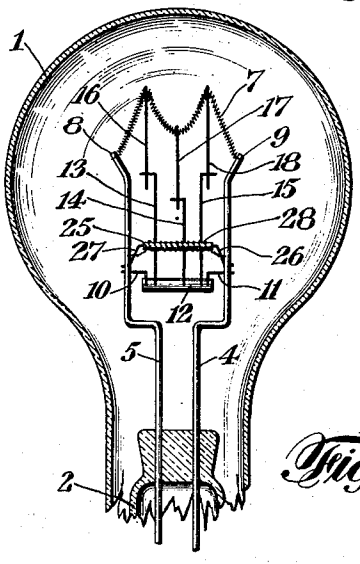
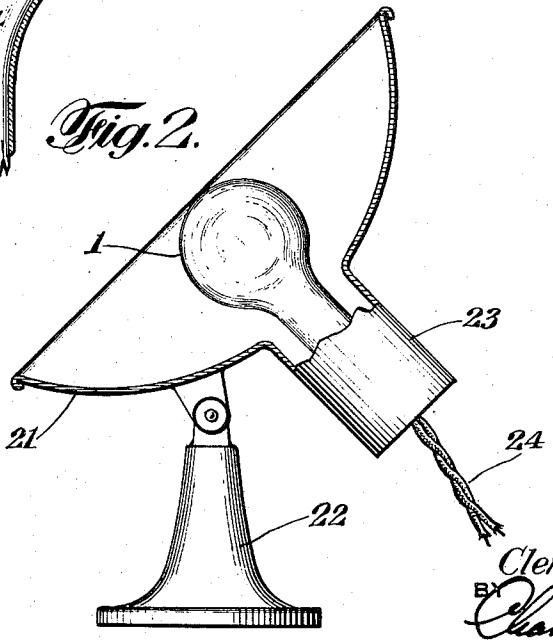


Fig. 2.



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RADIATING APPARATUS

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2 Claims. (Cl. 250—35)

My present invention relates to electrical apparatus adapted to emit light rays and heat rays including the invisible infra red and ultra violet rays. It more particularly relates to devices of this kind that are adapted to employ wave lengths and frequencies which are advantageous to employ therapeutically and to stimulate beneficial reaction in animal and plant life.

The instrumentalities employed to effect the purposes of my invention comprise among other things an electrical circuit, one portion of which consists of a radiating element capable of sustaining a high temperature, an envelope of quartz or of a glass or other material which will not obstruct the passage of either infra red or ultra violet rays. This envelope may be either transparent or translucent and preferably it will have on the inside thereof a film of a material such as yellow phosphorus which is adapted to absorb deleterious gases or vapors that may be present within the envelope enclosure or occluded in the walls thereof and which may modify the color tones of the light rays but which will not interfere with the passage of the invisible rays which it is an important object of the invention to utilize in a serviceable manner. Within the envelope and surrounding the radiating element is enclosed a gaseous atmosphere, inert as to the material of the radiating element but having marked heat conveying capacity. A very desirable gas to employ as an atmosphere within the envelope is hydrogen which has very high heat conducting properties and is inert to such metal as tungsten which may be a desirable material to employ for the radiating body. However, for general purposes, hydrogen in a pure condition has the disadvantage of conveying so much heat from the radiating body that it may more or less rapidly cause the envelope or the seals of the envelope to fuse. Furthermore, if a particularly pure hydrogen is used with a radiating body composed either wholly or partially of tantalum, the atmosphere is not inert as to the material of the radiating element.

I prefer, therefore, to employ a radiating element of a material to which hydrogen is inert; also to employ an envelope of quartz or pyrex glass transmitting ultra-violet rays and capable of sustaining and radiating a large amount of heat rays into the room or other space within which the device is placed. Furthermore, a mixture of hydrogen with another inert gas, such as nitrogen, even though the proportion of hydrogen be relatively small, will convey sufficient heat from the radiating body operating at high temperature to the envelope and will produce a sufficiently high heat radiating surface on the envelope to serve the purposes of the invention efficiently.

I may also use as an atmosphere deoxygenated air and phosphorus vapor. In this case the envelope need not be exhausted as in the usual practice. The phosphorus vapors may be provided by flashing phosphorus compounds within the closed envelope while the radiant element is operated at high temperature. In this manner, all water vapor and oxygen are taken up, leaving a residual gas or mixture of gases inert to the radiant body. A thin film of phosphorus or phosphorus compounds is deposited thus on the inner surface of the envelope but neither the film nor the envelope absorb any appreciable amount of the desirable rays.

In the development of artificial illumination, the quest for intense and concentrated light sources has led to the generation of white, harsh, glaring and lifeless light radiation which in its passage through ordinary glass is strained and deprived of substantially all rays except those within the visible spectrum. Such radiation may have deleterious effects. It is also true of the development of artificial heating resistor units that such devices usually employ wires for the radiating body of nickel chromium alloys or other wires of low melting point. Such radiant bodies operating only at red heat radiate only a small quantity of visible light rays and practically no ultra violet rays. Most of their energy is given off as heat of a comparatively low value.

The present apparatus may be connected into the ordinary house lighting circuit. Nevertheless, it combines the effects of both the ordinary electrical heat resistor having a low melting point radiant element and also the effects of a device having a radiant body operating at high temperatures and producing ultra violet rays. It assists in producing the beneficial effect of the device to reduce the superficial area of the envelope for the reason that, according to the particular purpose for which it is desired to use the device of this invention, the proportionate relations of the superficial area of the envelope and the wattage of the radiant element may be adjusted.

It may be necessary where powerful effects are to be produced, as, for instance, in large enclosed spaces, to constitute the radiant element of very heavy wires and to enlarge the envelope accordingly. In such case a highly refractory metal would be chosen for the material of the radiant

body, such as tantalum or tungsten. Dense carbon may also be used. The hydrogen content of the gaseous atmosphere should be increased or diminished in accordance with its chemical activity with the material of the radiant body. If the radiant element were tantalum, it should not be used at all. With a radiant element consisting of carbon, one might use a mixture of gas containing as high as 50% of hydrogen. But if the radiant element consisted of tungsten, it would not be necessary to use more than 2% of hydrogen, although more might be used with advantage where large enclosed spaces were to be served. As the percentage of hydrogen is diminished, the enclosing envelope may be made smaller so as to bring it closer to the radiating element for the envelope itself is designed to radiate heat conveyed to it from the radiating element by the gaseous atmosphere. The envelope may indeed be very small even where heavy currents are used.

The invention will be more clearly understood from the drawing accompanying this specification to which reference is now made, Fig. 1 being a more or less diagrammatic view, partly in vertical section and partly in elevation, of a lamp suitable for the practise of my invention; Fig. 2 is an elevation of the lamp operatively supported in a reflecting stand or support suitable thereto, the reflector element being shown broken away and partly in vertical section; and Fig. 3 is a more or less diagrammatic view showing a modification in the lamp.

In the drawing, an envelope 1 encloses a stem 2 to which it is sealed at 3. Heavy leads 4 and 5 of nickel or tungsten are sealed hermetically through the press 6 of the stem 2 in a manner well known in the art. A radiating body 7 consisting conveniently of a heavy coiled tungsten wire or other metal of high melting point, is welded to the leads 4 and 5 at 8 and 9. Due to the heaviness of the wire forming the radiating element 7, it is desirable to support it in position. This may be accomplished by suspending from the leads 4 and 5, by the angular supports 10 and 11, a glass-rod 12. Supported by this glass-rod are the metallic supports 13, 14 and 15. Mounted on the supports 13, 14 and 15, are molybdenum hooks or loops 16, 17 and 18, which engage and hold in place the radiating element 7. The leads 4 and 5 connect through appropriate external connections with a suitable source of electric current such as the ordinary house lighting lines.

In Fig. 2, the lamp is supported with its bulb and radiating element substantially at the focus of the reflector 21; and with the base of the lamp supposed to be supported by a suitable or ordinary lamp-socket (not shown) in the bottom of the hollow cylindrical extension 23 from the back of the reflector. The electric-light wires 24 connect with the socket as usual. The reflector element is shown pivotally supported on the upper end of the stand or base 22.

Preferably the envelope 1 of quartz or pyrex or corex glass is relatively small and compact and may be internally sand-blasted or frosted and coated uniformly with a film of yellow phosphorus and/or phosphorus compounds. The radiation emitting resistance element is shaped into close compact form so as to suitably fit the bulb portion of the envelope and operates in an inert atmosphere or preferably in a deoxygenated air to which has been added a quantity of hydrogen.

It is preferable in all cases and sometimes necessary in cases where the envelope is not evacuated of air before sealing, to introduce into the envelope a suitable chemical to take up such gases as may be deleterious to the radiant body. It is particularly necessary, no matter what material may be used to form the radiant element, to take up all water vapor which has a very destructive effect upon practically all metals and on carbon when they are operated at high temperatures. Water vapor may be driven out of the glass envelope or other glass parts when they become heated; it may be formed within the envelope when oxygen and hydrogen are both present therein; and by constant combination and dissociation, act upon the material of the radiant body to form compounds of that material and later to reduce the compound so as to free the combined gases and permit them to combine once more to form water vapor,—the whole cycle being repeated over and over again.

It is important, therefore, in the present invention to introduce into the envelope a chemical element that will take up oxygen. Phosphorus is especially effective for this purpose as it combines very readily with oxygen, forming light colored compounds which deposit on the inside of the envelope. I, therefore, insert in the envelope a capsule or "pill" 19 of nickel or other suitable metal enclosing a charge of phosphorus, yellow or red, the capsule being supported from the support 14 by the support 20. More specifically, this capsule 19 may be filled with a compound of phosphorus or boron with nitrogen and/or hydrogen and may be coated with red phosphorus. When the device is finished, sealed off and the atmosphere of either inert conveying gases is introduced after evacuation or after flushing, or of deoxygenated air formed in the manner described without evacuation, the phosphorus capsule 19 is heated or flashed by an induced electrical current produced by bringing a high frequency coil down over the bulb in a manner well known in the radio tube art.

By this flashing step the phosphorus on the surface of the capsule and the phosphorus compound in the capsule 19 is vaporized. The phosphorus combines with the oxygen within the envelope, if any, and deposits on the inside of the envelope in a thin whitish or yellowish film which modifies the light rays to a soft yellowish glow of the quality of sunlight but does not obstruct either the infra red or the ultra-violet rays.

In the modified lamp (Fig. 3), an extra circuit is provided in multiple with the filament 7 for flashing the phosphorus or phosphorus compound and which at the same time serves to provide an additional source of ultra-violet radiation. Thus, 25 is a cylindrical or other suitably shaped insulator of suitable refractory material with its ends engaged by two independent metallic supports 26 and 27 which are themselves supported by being welded respectively to the leads 4 and 5. Coiled about this insulator is a suitable refractory filament, such as a tungsten filament 28, which is itself closely coiled, with its ends welded to the leads 4 and 5 so as to receive current therefrom in multiple with the filament 7. The phosphorus or phosphorus compound, or other suitable or desirable getter, is applied to the surface of the refractory insulator 25 and to the coiled filament 28. The filaments are designed so that when the operating current is applied to the lamp, the filament 7 and the filament 28 both incandesce; and the latter in turn heats the insulator 25 to incandescence. This flashes the phosphorus or phosphorus compound on 25 and

28 which is preferably present in sufficient quantity to act not only as a getter but also to form a sufficient coating of yellow phosphorus compound on the interior surface of the lamp envelope or bulb to impart a soft yellowish color to the light. Preferably, the atmosphere in this modified lamp, like that described in connection with the other lamp, comprises or includes hydrogen or both nitrogen and hydrogen. The Fig. 3 modification serves as a substitute for flashing a chemical in a capsule 19, as previously described in connection with Fig. 1. It also gives additional ultra-violet radiation.

The refractory insulator 25 is preferably made of magnesia or thoria or of a mixture of the oxides of thorium and cerium or other suitable oxides.

My radiant heater combines the ultra-violet rays of sunshine with the therapeutic value of heat rays from an electric heater and at the same time emits soft tinted yellow rays approximately the color of sunshine. The ultra-violet emission from my radiant heater shows an intensity of 1.0 to 3.0. Its intensity is, therefore, much lower than the carbon arc or mercury vapor lamp supplied for medical use. Therefore, an indefinitely long application of my radiant heater is no more harmful than an indefinitely long application of sunlight, while a carbon arc or mercury arc application, unless carefully applied, would be very harmful.

Furthermore, the analysis of light emitted from my radiant heater shows that it does not pass wave lengths shorter than 2600 Angstrom. It is fairly well established that invisible rays between 2800 Angstrom and 3200 Angstrom is the most effective range for producing erythema (sunburn) and effecting the cure of certain human diseases. Some authorities prefer a scale between 2600 and 3200 Angstrom. However, some of the shorter wave lengths have been proven to be detrimental to human health and I have so designed my radiant heater that these are not present. It can, therefore, be seen that my radiant heater not only serves as a medium for heat and light, but has also great therapeutic value and also can be employed for indoor photography, both in the daytime and at night.

Above all else, my invention brings the beneficial and healthful heat and light rays of sunshine into the home during the dark weather and long nights, thereby stimulating body and plant activity, and making the home more cheerful.

My aforesaid invention is highly desirable even without its ultra-violet ray feature as when the invention is embodied in any electric incandescent filament lamp whose bulb or envelope consists of high melting point glass even though opaque to ultra-violet rays, and wherein said envelope is interiorly coated with yellow phosphorus sufficient to impart a soft yellowish color to the illumination.

What I claim is:

1. Method of making a radiating device having an envelope transmitting heat, light and ultra-violet rays and having a suitable refractory filament operatively supported in said envelope for electrical incandescence, said method comprising exhausting the envelope of atmospheric air; and flashing a phosphorus and hydrogen compound therein which sets free hydrogen.

2. Method of making a radiating device having an envelope transmitting heat, light and ultra-violet rays and having a suitable refractory filament operatively supported in said envelope for electrical incandescence, said method comprising exhausting the envelope of atmospheric air; and flashing a phosphorus hydrogen and nitrogen material therein which sets free hydrogen and nitrogen.

CLEMENS A. LAISE.