

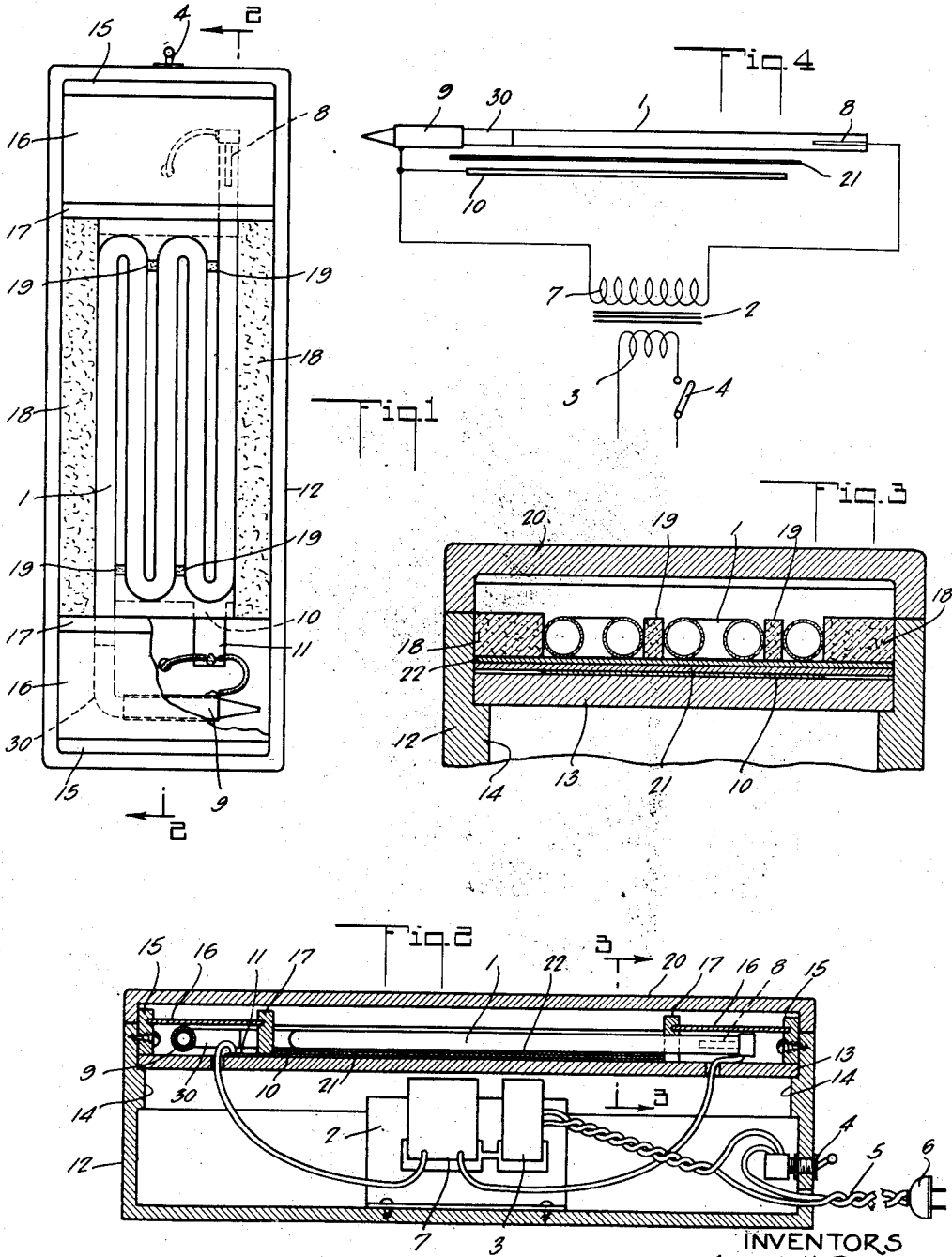
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RADIATION DEVICE

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RADIATION DEVICE

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9 Claims. (Cl. 176—124)

This invention relates to a device for producing radiations, and more particularly ultra-violet radiations by the aid of an oscillatory current. This application is a continuation in part of a prior application, filed May 31, 1939, in the name of Riess and Rolfe, under Serial No. 276,512, and entitled: "Therapeutic devices."

The stimulating effect of ultra-violet rays upon living tissue is now well recognized. However, it is essential that the intensity of the radiations, especially for the human body, be moderate, for otherwise the rays have a destructive effect upon the living cells of the body.

It is one of the objects of this invention to provide a simple, inexpensive device so arranged that it produces the desirable mild radiations, and particularly by the aid of a high frequency luminous tube discharge.

In furtherance of this object, a tube is provided upon which a body member, as a hand or foot, is adapted to rest for receiving the radiations.

It is another object of this invention to ensure against annoying sensations, analogous to pin-pricks, often encountered in using tubes of this general character.

This invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown a form in the drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

Referring to the drawing:

Figure 1 is a top plan view of an apparatus embodying the invention, the cover being removed and a portion being broken away;

Fig. 2 is a sectional view taken along plane 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view taken along plane 3—3 of Fig. 2; and

Fig. 4 is a wiring diagram of the apparatus illustrated in Figs. 1, 2 and 3.

A luminous tube 1 is shown in this instance as having a number of convolutions so as to form a grid-like structure. This luminous tube is adapted to be filled with a mixture of one or more of the noble monatomic gases, such as neon. A few drops of mercury may be enclosed within the tube in order to ensure the production of copious ultra-violet rays in the manner to

be hereinafter described. The pressure of the gas mixture within the tube may be of the order of 10 or 20 millimeters of mercury. The tube is preferably made of such material that can pass to some extent ultra-violet radiations. It is not necessary to utilize for this purpose a quartz tube, as there are other types of glasses which are not entirely opaque to the passage of these rays.

The excitation of the tube is effected by the aid of a transformer 2, which is of the conventional constant current type. This transformer is shown as having a primary coil 3 adapted to be connected as by the aid of a manually operated snap switch 4 to an appropriate commercial source of low voltage alternating current, as by the aid of the conventional leads 5 and plugs 6. The terminals of the secondary coil 7 are arranged respectively to be connected to appropriate terminals at opposite ends of the tube 1. The secondary electromotive force induced in the coil 7 is designed to cause excitation of the tube 1, and is dependent upon the tube length. In ordinary cases, this electromotive force may be in the neighborhood of 1000 volts, and may be as high as 6000 volts. The current delivered by the secondary coil 7 is of the order of 10 to 20 milliamperes.

The right hand terminal of transformer 2 is connected to an electrode 8 which is in direct communication with the interior of the tube 1. The left hand terminal of the secondary coil 7 is connected to a sleeve-like electrode 9 telescoping over the end of the tube 1 and therefore not in direct communication with the gaseous filling within the tube 1; but instead the electrode 9 is capacitively coupled to the tube interior. The effective area of the exterior electrode 9 may be extended by a coating of aluminum in the form of band 30 extending over the glass of the tube adjacent the sleeve-like electrode 9.

It is well understood that if a sufficiently high electromotive force be impressed across electrodes such as 8 and 9, the gas within the tube 1 luminesces. In view of the fact that there is considerable self-inductance in the circuit as well as capacity, of such order as can sustain a high frequency discharge through the tube 1, the current set up in the tube has a large component of frequency much higher than the frequency of the source of supply. The column of luminous gases within the tube 1 sets up a comparatively mild ultra-violet radiation, which may be profitably utilized as hereinbefore explained in connection with members or parts of the

human body. For example, the hand or foot may be placed directly upon the grid 1 for obtaining this treatment.

In order to assist in the oscillatory discharge, the external electrode 9 is electrically connected to a conducting plate 10 disposed immediately below the tube 1. To facilitate the making of this connection, the plate 10 may have a tab 11 extending beyond the lower edge of the plate 10 as viewed in Fig. 1. Plate 10 is substantially coextensive with the area occupied by the convolutions of tube 1.

The transformer 2, tube 1, as well as the plate 10 may be appropriately supported by the aid of a box or casing 12 provided with a removable cover 20. In the present instance the box and the cover are shown as made of wood. The transformer 2 may be appropriately supported upon the bottom of the casing 12. A shelf 13 may be provided extending across the upper end of the box 12 and resting upon the cleats 14. It is on the upper side of this shelf 13 that the tube 1 is supported in exposed position. The shelf 13 may be restrained against removal, as by the aid of the end strips 15, extending over the edge of the shelf and fastened to the inside of the casing 12. The electrode ends of the tube 1 may furthermore be covered by the plywood panels 16 having a tongue and groove joint with the strips 15 and the strips 17, spaced from strips 15. The strips 17 are formed with appropriate apertures to permit the passage of the ends of the tube in the spaces defined by the panels 16 and shelf 13.

The tube 1 is shown furthermore as held against mechanical vibration by the felt strips 18 interposed between the end turns of the tube 1 and the sides of the box 12. These felt strips may be appropriately attached by adhesive to the sides of the box. Similar felt strips 19 inter-mediate the convolutions may also be provided.

The switch 4 is shown as supported by one of the end walls of the box 12, and arranged with its manipulating element outside of the box. The cover 20 for the box 12 may telescope over the projecting ends of the strips 18, as indicated most clearly in Fig. 2.

In connection with high potential tubes of this character, it has been noted that upon the bringing of the body close to the tube, a pricking sensation is encountered. This is due to the discharging of accumulated charges built up on current carrying members. Such an annoying sensation would be encountered since the tube 1 is intended to be placed in direct contact with the hand or foot or the like of the person using the apparatus, as by resting the hand or foot directly upon the grid formed by the tube 1. The uncomfortable sensations described are readily avoided in the present instance by the use of an insulation or dielectric member 21. This member may be of flat form, disposed directly over the conducting plate 10. It is preferably made of blotting paper or the like and it may be covered over with a layer 22 of velvet or other soft fabric.

Due to the alteration in the electric field occasioned by the interpositioning of the dielectric layers 21 and 22 between plate 10 and tube 1, the uncomfortable sensations above noted are entirely avoided.

The capacity of the body in conjunction with the plate 10 and the external electrode 9 ensures the creation of beneficial radiant oscillations, having a component in the ultra-violet region.

What is claimed is:

1. In a therapeutic device, a tube in the form of a flat grid adapted to be electrically energized to produce radiations, said tube at one extremity having a conductor external of the tube and forming the terminal for one end of said tube, said conductor providing an external electrode for the tube and forming the sole electrode at said extremity, and a conducting plate substantially entirely coextensive with the tube, over which the tube is supported, and in conducting relation to the terminal conductor.

2. In a therapeutic device, a tube in the form of a flat grid adapted to be electrically energized to produce radiations, said tube at one extremity having a conductor external of the tube and forming the terminal for one end of said tube, said conductor providing an external electrode that forms the sole electrode at said extremity, said tube having at its other extremity, an electrode in direct contact with the interior of the tube, and forming the other terminal of the tube, and a conducting plate substantially entirely coextensive with the tube, over which the tube is supported, and in conducting relation only to the external conductor.

3. In a therapeutic device, a tube in the form of a flat grid adapted to be electrically energized to produce radiations, and having a filling including a noble monatomic gas and mercury vapor, said tube at one extremity having a conductor external of the tube and forming the terminal for one end of said tube, said conductor providing an external electrode that forms the sole electrode at said extremity, and a conducting plate substantially entirely coextensive with the tube, over which the tube is supported, and in conducting relation to the terminal conductor.

4. In a therapeutic device, a tube in the form of a flat grid adapted to be electrically energized to produce radiations, and having a filling including a noble monatomic gas and mercury vapor, said tube having a conductor external of the tube and forming the terminal for one end of said tube, as well as an electrode in direct contact with the interior of the tube, and forming the other terminal of the tube, and a conducting plate substantially entirely coextensive with the tube, over which the tube is supported, and in conducting relation only to the external conductor.

5. In a therapeutic device, a tube adapted to be electrically energized to produce radiations, said tube having a conductor external of the tube and forming the terminal for one end of said tube, a conducting plate coextensive with the tube, over which the tube is supported, and in conducting relation to the terminal conductor, and a layer of insulation material substantially coextensive with the tube and having a dielectric capacity greater than air, interposed between the plate and the tube.

6. In a therapeutic device, a tube adapted to be electrically energized to produce radiations, said tube having a conductor external of the tube and forming the terminal for one end of said tube, as well as an electrode in direct contact with the interior of the tube, and forming the other terminal of the tube, a conducting plate coextensive with the tube, over which the tube is supported, and in conducting relation to the external conductor, and a layer of insulation material substantially coextensive with the tube and having a dielectric capacity greater than air, interposed between the plate and the tube.

7. In a therapeutic device, a tube adapted to

be electrically energized to produce radiations, and having a filling including a noble monatomic gas and mercury vapor, said tube having a conductor external of the tube and forming the terminal for one end of said tube, a conducting plate coextensive with the tube, over which the tube is supported, and in conducting relation to the terminal conductor, and a layer of insulation material substantially coextensive with the tube and having a dielectric capacity greater than air, interposed between the plate and the tube.

8. In a therapeutic device, a tube adapted to be electrically energized to produce radiations, and having a filling including a noble monatomic gas and mercury vapor, said tube having a conductor external of the tube and forming the terminal for one end of said tube, as well as an electrode in direct contact with the interior of the tube, and forming the other terminal of the tube, a conducting plate coextensive with the tube over which the tube is supported, and in conducting relation to the external conductor,

and a layer of insulation material substantially coextensive with the tube and having a dielectric capacity greater than air, interposed between the plate and the tube.

5 9. In a therapeutic device, a high voltage oscillatory tube having a filling of noble monatomic gas and mercury vapor, and of grid form, said tube having an electrode disposed around one end of the tube and out of direct contact with the interior of the tube, said electrode forming solely one of the terminals of the tube as well as an electrode adjacent the other end of the tube and in direct contact with the interior of the tube, a conducting plate coextensive with the tube, over which the tube is supported, and in conducting relation to the terminal conductor, and a layer of insulation material substantially coextensive with the tube and having a dielectric capacity greater than air, interposed between the plate and the tube.

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