Aug. 20, 1929. R. D. KLEEMAN 1,725,357

ULTRAVIOLET LIGHT THERAPEUTIC APPLIANCE

Filed Dec. 22, 1926

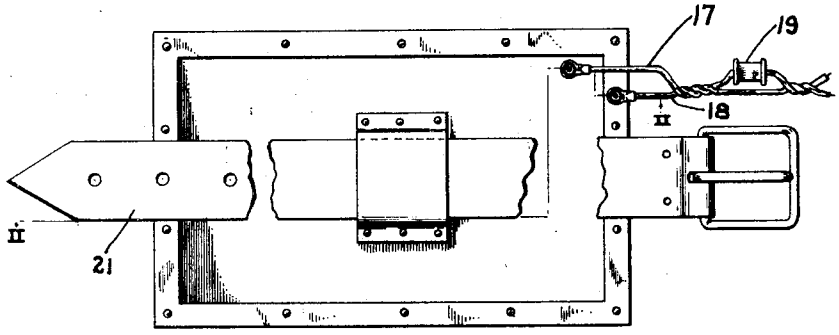


Fig. 1.

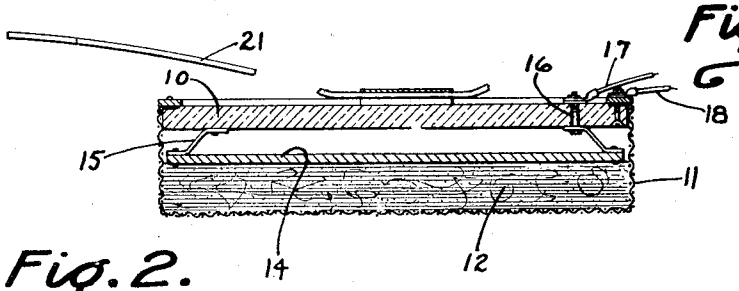


Fig. 2.

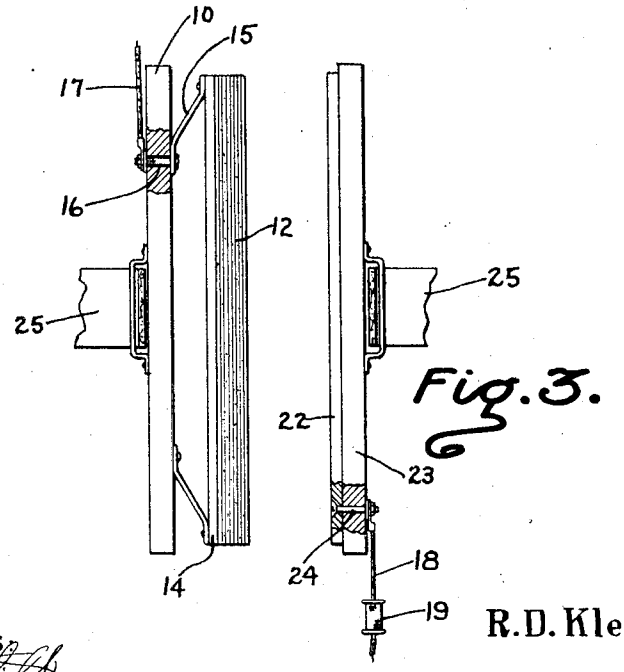


Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

RICHARD DANIEL KLEEMAN, OF SCHENECTADY, NEW YORK.

ULTRAVIOLET-LIGHT THERAPEUTIC APPLIANCE.

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My invention relates to therapeutic appliances, more particularly to appliances adapted to radiate ultra-violet light and it has for an object to provide apparatus of the character designated which shall be small, compact, inexpensive to manufacture and simple of construction. It has for a further object to provide an apparatus which may be conveniently applied to any portion of the human body and which shall be capable of stimulating the vascular system by the radiation of those shades of ultra-violet light which have been found to be the most beneficial.

These and other objects, which will be made more apparent through the further description of my invention, may be attained by the employment of the apparatus hereinafter described and illustrated in the accompanying drawing in which Fig. 1 is a plan view of one form of therapeutic appliance arranged in accordance with my invention; Fig. 2 is a section taken on the line II—II of Fig. 1 and Fig. 3 is a view, in elevation, of another form of therapeutic appliance arranged in accordance with my invention.

In the therapeutic treatment of diseases of the skin by exposure of the latter to violet-ray light, it has been the customary practice heretofore to generate the necessary light waves by means of an electric arc lamp. However, the ultra-violet rays given off by an electric arc lay mostly in the lower violet region whereas experience has shown that the rays of the upper violet region are more effective both chemically and therapeutically. Furthermore, experiments with the transmission of ultra-violet light upon the human body has shown that it is more effective to use a weak source of light for a long time than a strong source of light for a short time, due to the formation of protective changes in the skin.

Reference is now made to the discovery of G. Reboul, as set forth in Comptes Rendes 171 p. 1052 (1920); 172 p. 210, (1921); 173 p. 37 (1924), and Journal de Physique 6. 31 p. 341, 1922, that certain semi-conductors of electricity in a porous or fibrous state radiate ultra-violet light rays upon the passage of an electric current.

I have therefore conceived of an apparatus for the production and application of ultra-violet light which utilizes a pad of some porous semi-conducting material which has been thoroughly soaked in a dilute solution of an electrolyte and left to dry. The semi-conducting material is interposed between two electrodes connected through a suitable resistance to a source of electrical energy and the entire apparatus is provided with a strap or some other suitable means for fastening it to any portion of the human body. In this way, the passage of the current through the semi-conducting material emits ultra-violet light rays which are reflected upon the human body and the vascular system is thus stimulated.

Referring to the drawing for a more detailed description of my invention, I show in Figs. 1 and 2 one form of apparatus which embodies my invention. It consists of an insulating plate 10 to which is secured some perforated or screen-like material such as wire gauze 11 preferably arranged in the form illustrated and having, for example, about ⅛ in. mesh. Located within the wire gauze is a pad of semi-conducting material 12. This semi-conducting material may, for example, consist of blotting or filter paper which has been previously soaked in a dilute solution of an electrolyte such as, for example, a two percent solution of sulphuric acid in water, and then thoroughly dried. Pulverized salts may also be used if kept in place by sheets of heterogeneous paper. The salts mercuric sulphate, mercurous sulphate, or stannic oxide act particularly well. The pad of semi-conducting material generally has an area of about nine square inches and a thickness of about one-fourth or one-half of an inch although it is to be understood that it may be made of any size or shape to suit the individual requirements.

The material 12 is retained against the wire gauze by an electrode 14 which is secured to the insulating plate 10 by some resilient means such as springs 15 which are arranged to slightly compress the material 12 against the wire gauze 11. The electrode 14 is connected through one of the springs 15, a conductor 16 and a wire 17 to one side of a source of electrical energy such as a battery, a house lighting circuit, et cetera. The wire gauze 11, which serves as the other electrode, is connected through a wire 18 to the other side of the source of electrical energy. The external surface of the wire gauze is coated preferably with some insulating material such as varnish. A suitable resistance 19 having a capacity

of several hundred ohms is located conveniently in the electrical circuit. Suitable fastening means, such as a strap 21, is provided for securing the entire apparatus to the human body.

From the foregoing description, the operation of my apparatus will be apparent. The apparatus is secured by means of the strap 21 to any portion of the body which it is desired to treat, the gauze 11 being arranged adjacent to the body. Upon the electrical current being turned on, there is a flow of energy through the gauze 11 to the material 12 from whence it passes through the electrode 14, spring 15 and conductor 16, completing the circuit. As discovered by Reboul, the flow of the current through the material 12 results in radiating rays of ultra-violet light which are reflected upon that portion of the body to which the apparatus is secured. As stated heretofore, the rays emitted lay in the upper violet region which region has been found to be most effective. While the rays given off by my form of apparatus are not as intensive as those developed by an electric arc, nevertheless more effective results are obtained by radiating a weak source of light for a long period of time than a strong source of light for a short period of time. This may be readily accomplished with my form of apparatus because it is extremely light in weight and can be readily strapped to any portion of the body for several hours without discomfiture. It may even be applied during the night while the person being treated is asleep.

While I have described the material 12 as a semiconductor of electricity preferably composed of blotting or filter paper, it is to be understood that I may employ as the equivalents of blotting or filter paper any other substances which are capable of producing the desired results without departing from my invention.

Although I have shown my apparatus as being so formed as to be best adapted for application to a substantially flat or level surface, nevertheless, it is apparent that I may curve it or give it any contour or conformation so as to make it conform with any portion of the body. In addition I may connect several elements, such as shown in Fig. 1, together so that relatively large portions of the body may be treated at one time.

In Fig. 3 I show another embodiment of my invention in which the material 12 is sewn or glued or secured in some approved manner to the electrode 14, no gauze being provided. A second and separate electrode 22 is provided which is secured to a second insulating plate 23 and is connected through a conductor 24 to the wire 18. A suitable strap or fastening means 25 is associated with each insulating plate. With this arrangement, the electrode 22 and the material 12 are applied to different portions of the body and the current flows through the material 12 to the electrode 22, the circuit being completed by the passage of the current through the body.

While I have shown my invention in two forms, it is to be understood to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. In a therapeutical device, the combination of a non-conducting supporting member having attachment means associated therewith, a semi-conducting member treated with an electrolyte and in a dry state for radiating ultra-violet light rays, said semi-conducting member being carried by the non-conducting supporting member, and means for passing a current of electrical energy through the semi-conducting member.

2. In a therapeutical device, the combination of a non-conducting supporting member having attachment means associated therewith, a fibrous or porous substance with an electrolyte for violating ultra-violet light rays, said semi-conducting member being carried by the supporting member, and means for transmitting a current of electrical energy entirely through said fibrous or porous substance.

3. In a therapeutical device, the combination of two relatively good conductors adapted to be connected in circuit with a source of electrical energy, and a third relatively poor conductor connected in series with and retained between the first two conductors for emitting therapeutic light rays upon the passage of an electrical current therethrough, said third relatively poor conductor being composed of absorbent material which has been treated with an electrolyte.

4. In a therapeutical device, the combination of a relatively poor conductor composed of an absorbent material treated with an electrolyte, relatively good conductors arranged upon opposite sides of the poor conductor, one of said good conductors being perforated and having its external surface insulated, and means for passing a current of electrical energy through the three conductors in series for emitting ultra-violet light rays through the openings in the perforated conductor by the poor conductor.

5. In a therapeutical device, the combination of an insulating member having attachment means associated therewith, a per-

forated conducting member secured to the insulating member, a second conducting member interposed between the perforated conducting member and the insulating member and flexibly supported upon the latter, a semi-conductor treated with an electrolyte and dry for radiating ultra-violet rays, said semi-conductor being retained under compression between the perforated conducting member and the flexibly supported conducting member, and means for connecting the three conductors in circuit with a source of electrical energy.

6. In a therapeutical device, the combination of an insulating member having attachment means associated therewith, a perforated conducting member secured to the insulating member, a second conducting member interposed between the perforated conducting member and the insulating member and flexibly supported upon the latter, a fibrous member treated with an electrolyte for radiating ultra-violet rays retained under compression between the perforated conducting member and the flexible supported conducting member, means for insulating the exterior surface of the perforated conducting member, and means for connecting the three conductors in circuit with a source of electrical energy.

In testimony whereof, I have hereunto subscribed my name this 8 day of Dec., 1926.

RICHARD DANIEL KLEEMAN.