March 22, 1927. 1,622,142

F. GIRARD

IRRADIATION DEVICE FOR THERAPEUTICAL AND OTHER PURPOSES

Filed Nov. 17, 1922 2 Sheets-Sheet 1

Fig. 1.

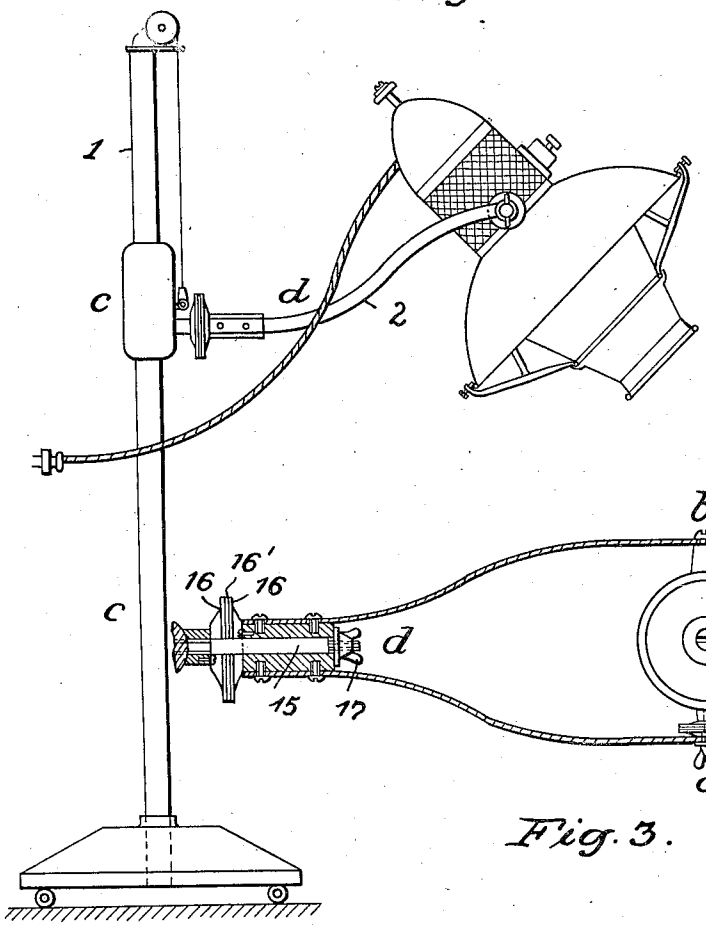


Fig. 3.

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Fig. 2.

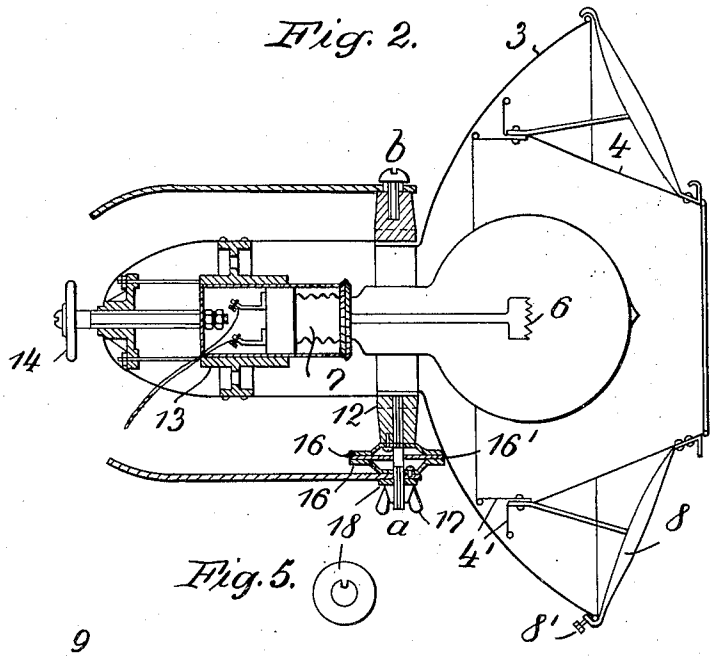


Fig. 5.

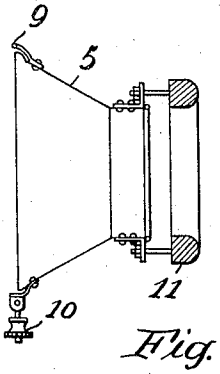


Fig. 2a.

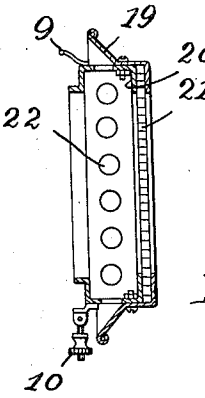


Fig. 4.

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Patented Mar. 22, 1927. 1,622,142

UNITED STATES PATENT OFFICE.

FRITZ GIRARD, OF HANAU-ON-THE-MAIN, GERMANY, ASSIGNOR TO THE FIRM: QUARZ-LAMPEN-GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF HANAU-ON-THE-MAIN, GERMANY.

IRRADIATION DEVICE FOR THERAPEUTICAL AND OTHER PURPOSES.

Application filed November 17, 1922, Serial No. 601,612, and in Germany November 21, 1921.

My invention has reference to an irradiation device which utilizes both light and heat rays, more particularly for therapeutical and similiar purposes, though the invention is not restricted to this particular mode of application, and it provides an apparatus of the kind referred to of very simple construction which fulfills all the requirements heretofore made for apparatus of this kind in a manner not heretofore attained. Among other important objects my invention provides improved means for adjustment and further means for advantageously utilizing a maximum of the available rays produced.

In the practice of therapeutics it is intended by light and heat irradiation to either intensely radiate the rays over the entire surface of the body of the patient or to treat only smaller or larger sections of the skin with different degrees of intensity. It is desirable in this connection to apply the particular irradiation to be utilized to every portion of the body with as few and simple manipulations as possible, without requiring the patient to assume uncomfortable positions, and in view thereof the apparatus according to this invention provides means for allowing a rapid and simple adjustment in every desired position of both the relative arrangement of the cone of rays in space as well as of the direction of such rays, and it also provides means for the rays to remain in the adjusted position with security. Furthermore, the medical practice calls for a graduation of the irradiation as regards its quality, that is to say, the wave length, this being accomplished by the insertion of light filters in the cone of radiation. For the purpose of ensuring the desired results the proper selection of a sufficiently strong source of light and heat becomes necessary; and preferably a special metal filament lamp consuming at least 1000 watts an hour is employed, preferably of such construction that the lamp will burn in any position without danger of a premature damaging of the incandescent metal filament occurring. Provision should, however, also be made to increase the radiation for the purpose of producing the extremes of light and heat effects.

An apparatus constructed in accordance with the present invention is excellently adapted to accomplish all these purposes. The invention will be more fully described with reference to the accompanying drawings, showing by way of example an apparatus embodying the principles of my invention. In the drawings—

Figure 1 is a side view of the entire apparatus, while

Figure 2 is a considerably enlarged sectional view of the lamp casing;

Figure 2^a is a like view of an additional reflector.

Figure 3 is a somewhat enlarged sectional view of the supporting bracket of the casing, while

Figure 4 is a sectional view through a filter arranged so as to be interchangeable with the reflector shown in Fig. 2^a, and

Figure 5 shows a detail of a safety washer.

As appears from Fig. 1 of the drawing, the apparatus comprises substantially a supporting stand 1 with a supporting arm 2 mounted thereon and adapted to be rotatable on the same, and upon which the reflector casing 3, 4, 5 is supported, in the interior of which the source of light 6 is fastened by means of the socket 7.

The reflecting portion of the apparatus is composed of a parabolic reflector 3 secured to the supporting parts of the source of light, and of a funnel-shaped, sectional and inwardly polished hollow reflector 4, 5. The larger part 4 of the same is hooked to the edge of the parabolic reflector 3 by means of a plurality, for instance three, struts 8 provided with hooks and by means of a small screw 8′, securing the same in position. While the parabolic reflector by itself radiates light and heat with moderate intensity at an angle of about 140°, the angle of radiation from the opening of the funnel-shaped reflector 4, at an intensity increased by lateral reflection, amounts to only about 60°. In order to provide for cooling of the parts by a circulation of air the funnel-shaped reflector 4 is out of contact with the parabolic reflector 3 so as to leave a slot between the two reflectors, a protecting ring 4′ at the edge of the larger opening of the funnel-shaped reflector preventing the escape of considerable portions of the direct or of reflected light. For the purpose of increasing the intensity of radiation the smaller funnel-shaped reflector 5 constituting a continuation of the larger one may be secured to

the funnel-shaped reflector 4 by means of a hook-connection 9 and a swingingly mounted clamping screw 10. With a correspondingly increased intensity of radiation the angle of radiation will then be reduced to about 30°. By the intense-radiation of heat the marginal portion of the small funnel will be heated to such a degree that upon touching it with the human skin burning thereof will result. In order to avoid this, a protective ring 11 of heat insulating material, such as cork, is mounted at a small distance from the opening of the shaft of the funnel and upon the edge of the same, the said ring being cooled by the air circulating between the edge of the funnel and the ring.

A supporting ring 12 has mounted thereon the parabolic reflector, and the supporting means and the protecting casing for the socket 7. The supporting means comprise a cylindrical guide 13, in the interior of which the socket 7 is axially displaceable by means of a threaded spindle provided for operation with a hand wheel 14 or the like. By this means it becomes possible to vary the distance of the center of the source of light from the focus of the parabolic reflector within the limits between zero and several centimeters whereby it becomes possible to adapt the dispersion and consequently the intensity of radiation to the particular degree of consumption desired and to delicately vary the same in progressive portions.

It is known to secure pieces of apparatus of this kind and similar devices with a view of facilitating the movability and adjustability in all directions upon supporting arms provided with one or a plurality of ball joints or universal joints. If the weight of such apparatus does not exceed a certain admissible, the well-known link connections may be used, while with heavier apparatus as in the present case these means of connection do not suffice, owing to the fact that sufficient friction for retaining the apparatus with security in all positions cannot be secured for any length of time. In the apparatus according to this invention a kind of cross or universal joint is likewise used, but with the peculiarity that its two axes of rotation are not situated in one and the same plane, but cross each other in space at a certain distance approximately equal to the length of the supporting arm. In this manner not only the adjustability in all directions as in the case of the ordinary ball and universal joints is obtained, but the further possibility is afforded of furnishing the joints, which are separated from each other, with a substantial, extensive and therefore reliable and easily accessible braking means, the frictional action of which may, moreover, be made adjustable.

In the embodiment shown by way of example in the drawing the two axes of rotation crossing each other in space are constituted by the axis *a*—*b*, which passes through the trunnions of the supporting ring 12, and on the other hand the axis *c*—*d* passing through the pivoting stud 15 of the supporting arm 2. The braking means for both axes comprises two compressed spring actuating steel discs 16 of which one is secured to the stationary part, while the other is mounted on the relatively movable part, which carries it along by aid of a pin or the like. Both discs bear upon each other under pressure and their mutual friction may be moderated by an insertion disc 16′ of soft metal, fiber, card board, leather or the like. The compressing pressure is produced and regulated by a threaded bolt 15 and a nut 17. Between this nut and the steel disc mounted thereon a washer 18 is provided which by a suitable projection engages with a corresponding groove of the particular stud, by which means its rotation and the otherwise resulting automatic loosening of the nut is prevented.

The front portion 5 of the reflector may, if desired, be replaced with a light filter as represented in Figure 4 of the drawing. This filter consists of two pressed sheet-metal rings 19, 20, between which strips 21 of colored glass or of some other kind of special glass of particular transparency are retained. By making the filter disc of individual strips the bursting of the disc by heat is obviated. Ring 20 is provided with vent holes 22, and the umbrella-shaped formation of the other ring 19 has the effect of substantially preventing the escape of light through the vent holes. By means of fastening means 9 and 10 similar to those employed for the smaller funnel-shaped reflector 5 the filter can be secured to the opening of the large reflector 4 so as to replace the small reflector.

The invention has been shown merely by way of example in one of its preferred embodiments, but it is to be understood that I do not desire to be limited thereto, but may vary the construction and relative arrangement of the various parts and use other equivalent means to suit existing conditions and the convenience of the user and within the scope of my invention.

I claim:—

1. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting and reflecting means mounted at the end of said supporting arm for rotation about an axis extending at right angles to the axis of rotation of said arm and resilient frictional clutching means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for auto-

matically securing said parts in the adjusted position.

2. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting and reflecting means mounted at the end of said supporting arm for rotation about an axis extending at right angles to the axis of rotation of said arm, pairs of cooperating resilient friction discs between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position and screws for increasing the friction between said discs.

3. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel shaped reflector projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rotation of said arm and means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position.

4. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel-shaped reflector in several removably assembled parts, an inner and an outer part, projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rotation of said arm and means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position.

5. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm movable on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel-shaped reflector means at the outer end of said reflector for securing thereto a light filter projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rotation of said arm, means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position and a light filter adapted to be fixed to the outer end of said reflector.

6. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel-shaped reflector means at the outer end of said reflector for securing thereto a light filter projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rotation of said arm, means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position and glass strips assembled to form a light filter adapted to be fixed to the outer end of said reflector.

7. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm movable on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel-shaped reflector means at the outer end of said reflector for securing thereto a light filter projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rotation of said arm, means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position and an annular apertured cap, a funnel-shaped ring surrounding said cap and a plurality of glass strips between said cap and ring forming a light filter, said cap, ring and strips being adapted to be fixed to the outer end of said reflector.

8. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting means, parabolic reflecting means surrounding said light emitting means and a funnel-shaped reflector projecting into and extending axially of said reflecting means, said light emitting and reflecting means being mounted at the end of said arm for rotation about an axis extending at right angles to the axis of rota-

tion of said arm, means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position, said reflector being spaced apart from the inner wall of said parabolic reflecting means, and an annular screen mounted on the inner end of said reflector so as to screen off light rays from the gap between the parts.

9. Irradiation apparatus for therapeutic and other purposes comprising a supporting stand, a slide movable along said stand, a supporting arm mounted on said slide for axial rotation, light emitting and reflecting means mounted at the end of said supporting arm for rotation about an axis extending at right angles to the axis of rotation of said arm, resilient means for axially adjusting said light emitting means with regard to said light reflecting means and means between said slide and said arm and between said arm and said light emitting and reflecting means, respectively, for automatically securing said parts in the adjusted position.

10. Irradiation apparatus comprising in combination, a supporting arm, light emitting and substantially parabolic light reflecting means mounted on said arm for rotation in two planes at right angles to each other, sectional funnel-shaped outwardly reduced light reflecting means surrounding the light emitting means and within the parabolic light reflecting means and slightly spaced therefrom, means to detachably secure the different light reflecting means to each other and protecting means at the open front end of the outwardly reduced reflecting means.

11. Irradiation apparatus comprising in combination, a supporting arm, light emitting means and substantially parabolic light reflecting means surrounding the light emitting means and secured thereto and adapted for rotation in two different directions on said supporting arm, substantially funnel-shaped outwardly reduced light reflecting means within said parabolic light reflecting means surrounding the light emitting means and detachably secured to the parabolic light reflecting means, an annular protecting light shade at the open end of the funnel-shaped light reflecting means surrounding the light emitting means and somewhat spaced from the parabolic light reflecting means, and means to lock the light emitting and reflecting means in the adjusted position.

12. Irradiation apparatus comprising in combination, a supporting arm, a holder adjustably and rotatably secured on said supporting arm, on said holder, a source of light mounted in said bearing and mounted on said holder, a substantially parabolic reflector surrounding the source of light and mounted on said holder, sectional, substantially conical, outwardly reduced additional reflecting means surrounding said source of light in spaced relation to said parabolic reflecting means, and relatively displaceable frictional brake discs on said holder adapted to secure the light emitting and reflecting means in the adjusted position.

13. Irradiation apparatus comprising, in combination, a supporting arm, light emitting and light reflecting means mounted on said supporting arm for rotation and adjustment in different directions, a marginally apertured annulus detachably secured to the reduced end of the conical reflecting means, a substantially funnel-shaped annular protecting shade surrounding the apertured marginal part and a light filter at the outer end of said annulus comprising a plurality of sectionally combined colored glass plates.

In testimony whereof I affix my signature.

FRITZ GIRARD.