Aug. 14, 1928. 1,680,583

F. A. ANDERSON

THERAPEUTIC LAMP

Filed Jan. 13, 1927

Fig. 1.

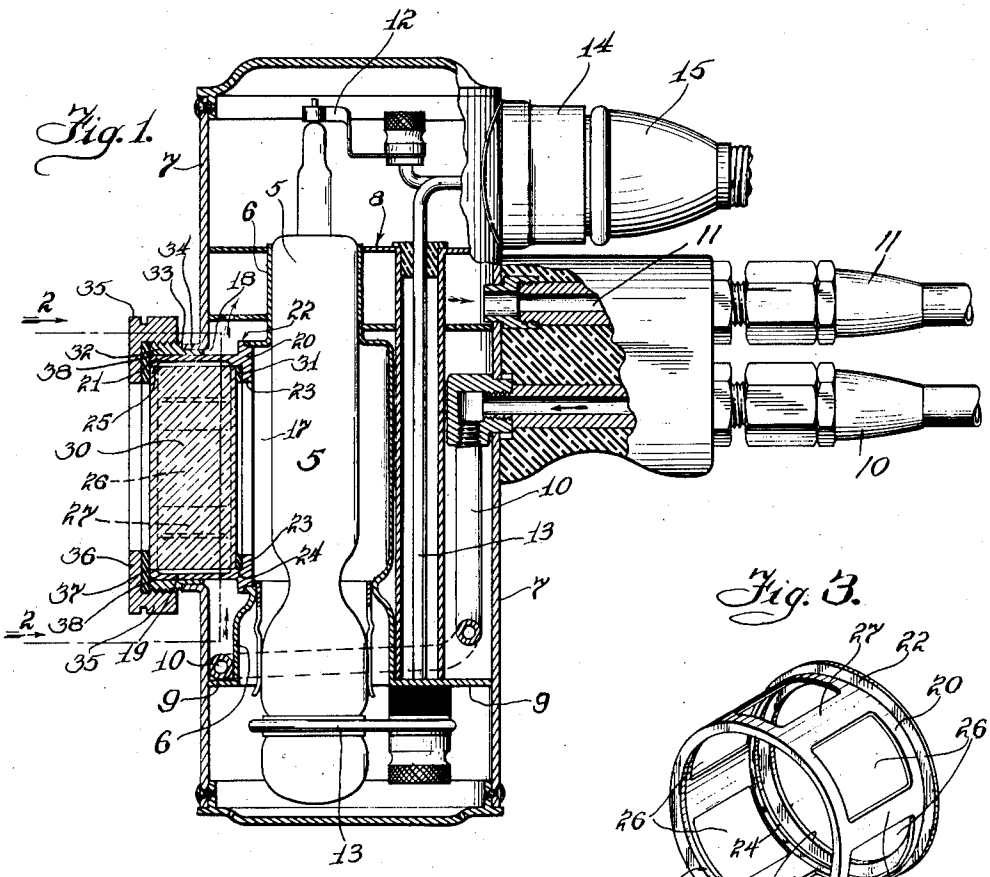
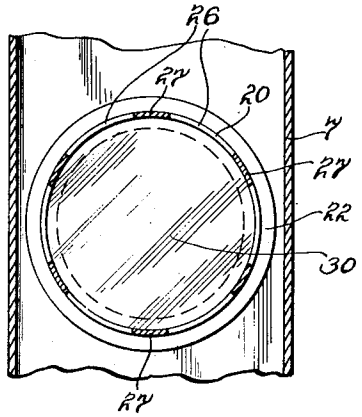



Fig. 3.




Fig. 2.




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# UNITED STATES PATENT OFFICE.

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## THERAPEUTIC LAMP.

Application filed January 13, 1927. Serial No. 160,802.

My invention relates to therapeutic lamps.

It will be explained as embodied in a water-cooled lamp wherein the light rays are generated by a mercury arc enclosed in a quartz tube or envelope.

Water-cooled mercury arc lamps, such for example as illustrated in Fritz A. Anderson Patent No. 1,435,193, dated November 14, 1922, and F. W. Robertson, et al., Patent No. 1,568,345, dated January 5, 1926, have been employed extensively, but certain difficulties have been encountered in their use due to the formation of films or fogs upon the faces of the lenses through which the light rays pass.

In order to cool the quartz lenses and the rays passing therethrough, it has been the practice, as shown in the patents heretofore mentioned, to cause the cooling water to circulate over the faces of the rock quartz lenses through which the rays are projected. Experience has shown that sooner or later the lenses become fogged or filmed with a deposit which seriously interferes with the passage of the light rays, particularly the highly germicidal short ultra-violet rays. Thus the efficiency of the lamp may be seriously affected, and the germicidal properties of the light emanating therefrom materially lessened after a short period of use. Likewise, the establishment and repetition of a standard or fixed technique is interfered with because of the variations in the quantity and quality of the ultra-violet ray output. Thus, when the lenses are free from deposit, a time of application which would result in painful and possibly serious burns, would not be long enough for proper treatment, when the lenses become filmed after a few days or a few weeks of service.

The principal source of this deposit is believed to be ingredients carried by the cooling water, such as the mineral content of the water and particles of metal, rubber and other substances washed from the pipes, tubing and other appliances associated with the cooling-water supply. Possibly the deposit may be accelerated by the action of the light rays upon the water-borne ingredients. But whatever the cause may be, it has been impossible heretofore entirely to eliminate the difficulty, even with the use of distilled water and specially prepared tubing and metal parts in the cooling system.

One of the objects of my invention is to provide an improved therapeutic lamp.

Another object is to provide a lamp with lenses which are fluid cooled, but cannot be deleteriously fogged or filmed by the cooling fluid or ingredients carried thereby.

Another object is to provide a lamp wherein the cooling fluid does not come in contact with any lens face.

Another object is to provide a lamp wherein the lenses are cooled by direct contact with the cooling fluid at the edge only.

Another object is to provide a lamp which is strong, durable, uniformly efficient, and inexpensive to produce.

Other objects and advantages will hereafter appear.

One embodiment of the invention, incorporated in a lamp of a generally well-known type similar to that shown in the aforesaid Anderson patent, is illustrated in the accompanying drawing, wherein

Fig. 1 is a substantially axial section through a complete therapeutic lamp embodying my invention,

Fig. 2 is a section on the line 2—2 of Fig. 1,

Fig. 3 is a perspective of the lens holder.

The lamp chosen for illustration comprises in general a housing and a mercury arc lamp or burner 5 of well known type. The housing includes two spaced apart metal casings, an inner casing 6 and an outer casing 7. The space between the casings forms a cooling-fluid chamber about the lamp or burner. This cooling-fluid chamber is closed at its upper end by a top wall 8 and at its lower end by a bottom wall 9. Water is fed to this chamber through an inlet connection 10 and is removable through an outlet connection 11. These inlet and outlet water connections may be coupled respectively to any suitable source of water supply and waste. Electrical connections are completed to the lamp terminals through conductors 12 and 13 leading from a receptacle 14 and a cord plug-connector 15. The construction thus

far described is well known and is illustrated and described in detail in the aforesaid Anderson patent.

The inner casing is provided with an opening or light window 17 and the outer casing is provided with a similar opening or light window 18. These windows are in alignment so that the rays of the lamp can pass therethrough from the inside to the outside of the housing and, for convenience in manufacture and assembly, I prefer to make them of circular cross section. Inner casing 6 about the rim of its window is internally threaded to receive the complementary threaded end of a lens holder or support 19. This lens support or holder, which is shown most clearly in Fig. 3, comprises a tubular metal shell having an annular flange 20 at its inner end and an annular flange 21 at its outer end. Inner flange 20 is externally threaded to fit the complementary thread about the rim of the window of the inner casing as previously mentioned, and has an outwardly projecting annular shoulder 22 adapted to abut the inner casing and thereby assist in the production of a fluid tight joint therebetween. Flange 20 is also provided with an inwardly projecting annular shoulder 23 and an annular ledge 24 against which the rear end of the lens is seated as will be hereinafter described. The forward flange 21 of the holder is provided with an annular ledge 25 against which the forward end of the lens is seated.

The barrel of the holder between the lenses is provided with a series of relatively large openings 26 so that the holder forms in effect an open-work cage consisting of the two end flanges and the relatively small and widely separated interconnecting webs 27.

The lens I consider preferable comprises a single solid cylindrical body 30 of fused quartz which is inserted within the holder to rest upon ledges 24 and 25, although, of course, a hollow lens may be used. I have found that for a lens diameter of about 1½″, the thickness should be about ¾″ to afford sufficient edge surface to maintain the lens at a suitable temperature. To insure against leakage a packing ring 31 of fabric or other suitable material may be interposed between the rear of the lens and the shoulder 23. A shouldered locking ring 32 is provided to support and retain the outer end of the lens holder and to close the opening between the holder and the rim of the window of the outer casing. To the rear of its shoulder 33 ring 32 may be externally threaded to screw into an internally threaded flange 34 which is formed in outer casing 7 about this window. After being screwed into place ring 32 and the flange of the outer casing may be soldered together. To the front of shoulder 33 ring 32 is externally threaded to receive a lens holding ring 35 provided with an inwardly projecting front annular flange 36. A packing ring 37 may be interposed between the lens and flange 36 so that when ring 35 is screwed into place the lens is held in its holder and water tight joints are assured. Lens retaining ring 35 may serve as part of a suitable adapter, such for example as that disclosed in F. A. Anderson Patent No. 1,559,062 dated October 27, 1925. In order to prevent the parts from becoming loose and to insure against leakage between the lens holder and locking ring 32, the adjacent front corners thereof may be slightly chamfered so that when they are properly positioned a small groove 38 is provided between them. A suitable solder may be run into this groove to effect a reliable seal and lock.

In operation the water enters the cooling-fluid chamber through inlet connection 10 and passes upwardly past the lens through outlet 11. Due to the open-work or cage-like construction of the lens holder the cooling water comes into direct contact with the lens but only about the edge thereof. And, since the lens is out of contact with the webs forming the barrel of the holder, the water bathes substantially the entire edge of the lens. None of the circulating cooling water can come into contact with either face of either lens and consequently whatever deposite may accumulate can have no dilatorious effect whatever upon the free passage of the light rays.

In addition to the elimination of light obstruction due to the fogging of the lens faces, the construction posseses a number of other important advantages. The elimination of the fogging of the faces of the lenses makes it unnecessary to clean their inner surfaces, and in consequence it is unnecessary to arrange for the ready removal of the lenses for cleaning purposes. Thus the lenses and holders may be non-removably anchored in position and breakage from accidental or deliberate removal is eliminated. Therefore proper adjustment can be made at the factory and, when once made, need not be disturbed. Also, because it is unnecessary to remove the lenses for cleaning them, they may be placed close to the burners, the thickness of the solid lenses rendering them less easily broken by heat or shocks, and the water tight packings remain more reliable, lessening the tendency for leakage. The elimination of fluid pressure against the faces of the lenses removes the danger or breakage in the event the water pressure rises. Assembling is facilitated because the relatively small areas of the lenses coming in contact with their seats makes variations and irregularities in the

edges of the lenses of relatively less consequence. As long as the annular corners of the lenses are properly seated and packed, the clearance between the barrels of the holders and the edges of the lenses permits considerable tolerance or manufacturing variations both in the barrels of the holders and in the body of the lenses.

Having thus illustrated and described an embodiment of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. A therapeutic lamp housing comprising a casing for enclosing a lamp and having a window therethrough for the passage of rays generated by the lamp, a lens closing the window in the casing, and fluid connections for circulating a cooling fluid about the lens against its edge only.

2. A lamp housing comprising a double walled casing, the walls having aligned windows, means for supporting a lamp within the inner casing, connections for taking a cooling fluid to and from the space between the casing walls, a lens, and a lens support bridging the space between the casing walls adjacent the windows, said support presenting only the edge of the lens to the cooling fluid flowing through the space between the casing walls.

3. A therapeutic lamp housing comprising a lamp casing having inner and outer spaced apart walls provided with aligned windows for the passage of light therefrom, an open work lens holder bridging the space between the casing walls adjacent the windows, and a lens seated in the holder to close the ends thereof and thereby presenting only its edge directly to the effect of the cooling fluid circulating through the space between the casing walls and through the open work of the holder.

4. A therapeutic lamp housing comprising a lamp-containing casing formed with two walls spaced apart to provide a chamber therebetween for the flow of a cooling fluid, the walls having aligned windows through which the light may be projected from a lamp within them, a tubular lens support framing and extending between the windows and having openings through its sides, and a single solid lens carried within the holder and closing the ends thereof whereby cooling fluid in the chamber between the casing walls comes into direct contact with the edge only of the lens through the holder openwork and cools the same.

5. A therapeutic lamp housing comprising a double-walled casing for holding a lamp, the space between the walls forming a cooling-fluid circulation chamber and the casing walls having aligned windows for the passage of light, a lens, and a tubular lens holder attached to both walls of the casing and bridging the space therebetween adjacent the windows, the holder having openings to permit the cooling fluid within the circulation chamber to come into direct contact with the edge only of the lens and the lens holder and lens serving to seal the circulation chamber about the windows to prevent leakage of the cooling fluid.

6. A therapeutic lamp housing comprising a double-walled metallic tubular casing for carrying a lamp, and having aligned windows for the passage of rays from the lamp, the space between the casing walls forming a cooling-fluid circulation chamber, a tubular openwork metallic lens holder bridged between the casing walls at the windows and in the path of the cooling fluid, and a solid quartz lens sealed within and supported by the holder to close the openwork thereof, and thereby cause the cooling fluid to circulate around the holder in direct contact with portions of the edge of the lens and out of contact wih the faces of the lens.

7. A therapeutic lamp housing comprising an inner casing and an outer casing having aligned windows and separated by a space forming a cooling-fluid chamber, a tubular lens holder provided with continuous ledges for supporting a lens adjacent its opposite annular corners in the windows, the ledges being interconnected by an openwork barrel which is out of contact with the lens and permits the cooling fluid to come into direct contact with only the edge of the lens when the holder is in position bridging the fluid chamber at the windows, a lens seated in the shoulder, and a retaining ring to hold the lens to its ledges.

8. A therapeutic lamp housing comprising a casing for enclosing a lamp and having a window therethrough for the passage of rays generated by the lamp, a lens in the casing window, and fluid connections for circulating a cooling-fluid in relation to the lens to withdraw heat therefrom through its edge only.

9. A therapeutic lamp housing comprising a casing for enclosing a lamp and having a window therethrough for the passage of rays generated by the lamp, a lens in the casing window, and fluid connections for circulating a cooling fluid about the lens in contact only with surfaces of the lens that are ineffective in permitting rays to pass through the window.

10. A therapeutic lamp housing comprising a double walled casing, the walls having aligned windows, means for supporting a lamp within the inner casing, connections for taking a cooling fluid to and from the space between the casing walls, a lens for the windows, and a lens holder for securing the lens in place with only such surfaces

in contact with the cooling fluid as are ineffective in permitting rays to pass out of the housing.

11. A therapeutic lamp housing comprising a lamp casing having inner and outer walls spaced apart to provide a cooling fluid circulating chamber therebetween and provided with aligned windows for the passage of rays from the casing, inlet and outlet fluid connections communicating with the chamber between the casing walls, a lens, and a ring for retaining the lens in place in the casing with only the lens area that is ineffective to pass rays out of the casing being in position for contact with the circulating cooling fluid.

In witness whereof, I hereunto subscribe my name this 11th day of January, 1927.

FRITZ A. ANDERSON.