

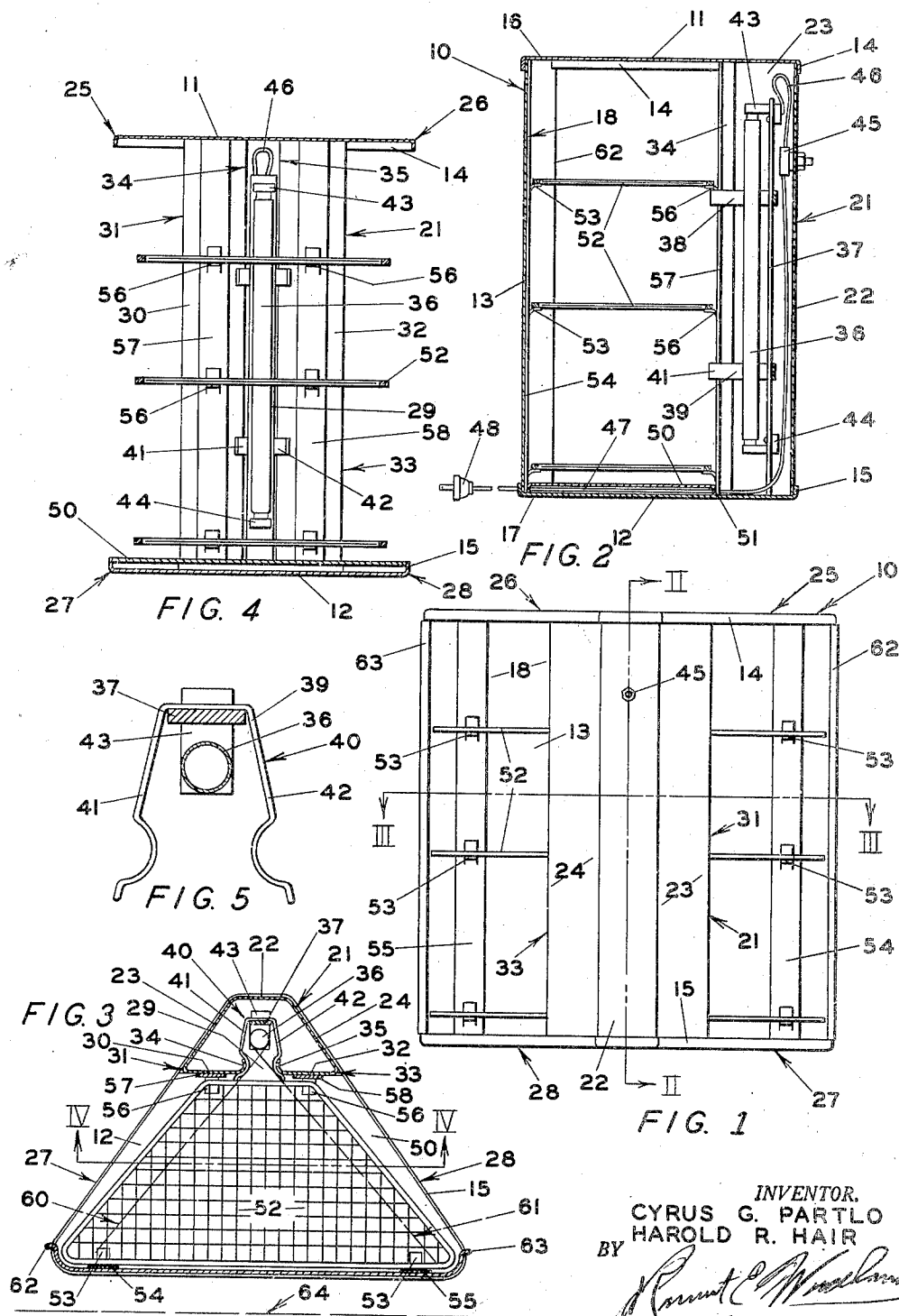
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RADIANT STERILIZER

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RADIANT STERILIZER

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This invention relates in general to a radiant sterilizer and more particularly to a type thereof which, although only partially enclosed, is so arranged and constructed that all of the direct sterilizing radiation and substantially all of the indirect sterilizing radiation from a germicidal lamp therein is confined to the sterile enclosure.

There are known partially enclosed radiant sterilizers which satisfactorily accomplish the task of sterilizing implements such, for example, as a barber's or a doctor's instruments. However, little or no means is provided in such known radiant sterilizers for protecting the eyes of persons in the vicinity of said sterilizers from the irritating and often harmful effects of the direct and/or indirect sterilizing rays.

Normally, very little consideration need be given to the indirect sterilizing radiation from a radiant sterilizer. However, especially where the said sterilizer is placed in front of a large mirror, as in the case of the usual barber shop, indirect radiation of the sterilizing rays off the mirror becomes a serious problem.

We are aware that there are radiant sterilizers presently in use in which the sterilizing radiation is produced by an ultra-violet ray tube, but in these the tube is horizontally disposed. Obviously, with such an arrangement objects such as barbers' implements which might be placed upon shelves within such a sterilizer will intercept the direct radiation from said tube on one side only. In order to overcome this problem, it has been suggested that numerous mirrored surfaces be provided by means of which the sterilizing radiation from said tube is reflected onto substantially all surfaces of said objects. However, this has been unsatisfactory since mirrored surfaces also reflect a large amount of the ultra-violet radiation out of the sterilizing cabinet, in which the tube and shelves are housed, and thence often into the eyes of persons nearby.

It thus becomes apparent that the sterilizing tube must be so positioned within a partially enclosed cabinet that effective exposure of all objects placed within the sterilizer is accomplished yet permitting no direct radiation and substantially no indirect radiation from said lamp to reach the eyes of persons in the vicinity of the sterilizer, even when said sterilizer is placed in front of a mirror as in the case of the usual barber shop.

Accordingly, it is a primary object of this invention to provide a partially enclosed, radiant sterilizer which will satisfactorily sterilize instruments placed within its closure but which is so constructed that all direct radiation and sub-

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stantially all of the indirect radiation from the germicidal lamp is prevented from reaching the eyes of persons in the vicinity of the sterilizer.

A further object of this invention is to provide a radiant sterilizer as aforesaid which is light in weight, simple to fabricate, easy to clean, and whose interior is very readily accessible.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon referring to the accompanying drawings and upon reading the following specification.

In meeting those objects and purposes heretofore mentioned, as well as others incidental thereto and associated therewith, we have provided a partially enclosed, radiant sterilizer comprised of a three-sided cabinet, one side of which is totally enclosed and opaque. The corner opposite said enclosed side is provided with a suitable enclosure which houses a germicidal lamp. An opaque top and bottom, and a plurality of removable shelves, which are transparent to ultra-violet radiation, are supported upon said enclosed side and the germicidal lamp enclosure.

For one preferred embodiment of the invention, attention is directed to the accompanying drawings in which:

Figure 1 is an end elevation view of said radiant sterilizer taken from the front, or tube containing end.

Figure 2 is a cross sectional view of Figure 1 taken along the line II—II.

Figure 3 is a cross sectional view of Figure 1 taken along the line III—III.

Figure 4 is a cross sectional view of Figure 3 taken along the line IV—IV.

Figure 5 is an enlarged, cross sectional view of the tube support bracket and germicidal tube shown in Figure 3, the section being taken on the line IV—IV of Figure 1.

The radiant sterilizer, hereinafter described in detail, is particularly designed for use in front of a mirror, such as in a barber shop, for illustrative purposes only, and no limitation is thereby implied upon the scope of the invention. As shown in Figures 1 and 2, the said sterilizer has an outer cabinet 10 which is comprised of a top sheet 11, a bottom sheet 12 and a back sheet 13.

For purpose of convenience in identification throughout the following specification and claims, the part containing the sterilizing tube, the rightward portion as appearing in Figure 2, will be designated the "forward," or "front," part of the device, and the part opposite thereto, the leftward portion as appearing in Figure 2, will be designated the "rearward," or "back," part of

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the device. This is because in normal barber shop use, the part designated as the back is placed against the wall or mirror and the part designated as the front is nearest the operator.

The top sheet 11 and bottom sheet 12, which are preferably parallel to each other, are substantially triangular, here shown as slightly truncated for better appearance, in shape and fabricated from a material, such as aluminum or stainless steel, which is opaque and which will reflect short wave radiation efficiently, where desired. A suitable, nonmetallic material, reflectively or non-reflectively coated as desired, may also be used if preferred.

The top sheet 11 has a downwardly turned rim 14 extending perpendicularly from, and preferably integral with, the outer edge thereof. The bottom sheet 12 has an upwardly turned rim 15, which extends perpendicularly from and is preferably integral with, the outer edge thereof.

The back sheet 13 is secured, in any suitable manner such as by brazing, soldering or riveting, along its upper and lower edges, respectively, to the rims 14 and 15 along the corresponding edges 16 and 17 of the respective top and bottom sheets 11 and 12. Said back sheet 13 is opaque, preferably rectangular in shape and may be fabricated from any suitable metallic or non-metallic material and so finished that its inside surface 18 will reflect little or none of the radiation, germicidal or otherwise, from the germicidal lamp. Said back sheet, if made from aluminum or steel, may be coated on its inside surface 18 with an appropriate, conventional substance, such as black paint, which will prevent such reflection.

A lamp enclosure 21, which is preferably but not necessarily shaped from a single sheet of material such as sheet metal, extends between the forward portions of the top and bottom sheets 11 and 12, respectively. Said lamp enclosure 21 is secured, as by brazing or riveting, along its upper and lower edges to those portions of the rims 14 and 15, respectively, surrounding the corners remote from the edges 16 and 17 of the said top and bottom sheets 11 and 12, respectively.

The lamp enclosure 21 has a front panel 22, substantially parallel to the back sheet 13, and a pair of side panels 23 and 24 which extend from said front panel 22 towards said back sheet 13. The upper and lower edges of the side panels 23 and 24 are aligned with, and adjacent to, the edges 25 and 26 of the top sheet and the edges 27 and 28 of the bottom sheet, respectively.

A rearward panel 30, substantially parallel with said front panel 22 extends inwardly from the edge 31 of said side panel 24, and another rearward panel 32, preferably co-planar with the rearward panel 30, extends towards said panel 30 from the edge 33 of the side panel 23. The opposed edges 34 and 35 of the rearward panels 32 and 30, respectively, are curved back towards the front panel 22, as appearing in the drawings, and define the opening 29 therebetween.

The lamp enclosure 21 which is completely enclosed except for the opening 29 which provides a radiation outlet from said enclosure, may house any type of conventional germicidal lamp such as an ultra-violet ray tube 36 (Figures 2 and 4).

A tube support bracket 40 is comprised of a tube support post 37, which may be fabricated from any convenient material, such as metal or wood, and a pair of identical metal clips 38 and 39 which may be secured to said post 37 by welding or riveting. The lower clip 39 has a pair of arms 41 and 42 which extend in substantially the

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same direction from the said support post 37. The outer, free ends of said clip arms are curved to correspond with the curvature in the curved edges 34 and 35 of said rearward panels 32 and 30, respectively. These edges 34 and 35 are engaged by said clip arms 41 and 42, as illustrated, for supporting the tube support bracket in operating position. Said clip arms 41 and 42 are so positioned with respect to each other that they must be sprung towards each other before they can be placed between said curved edges 34 and 35. The upper clip 38 is similar in all respects to the lower clip 39. The tendency for the arms of the said clips 38 and 39 to spread apart, when they are sprung together between the opposed, curved edges 34 and 35 of the front panels 30 and 32, respectively, holds said clips and the attached support post 37 firmly within said lamp enclosure 21.

A pair of conventional tube sockets 43 and 44 are mounted upon the said tube support post 37 near its upper and lower ends in any convenient manner, such as by bolting. A conventional switch 45, which may be bolted to the front panel 22, is connected to the upper socket 43 by means of an electric conduit 46. A lead wire 47 is connected at one of its extremities to the switch 45 and at its other extremity to a conventional male plug 48.

A germicidal lamp, such as the ultra-violet ray tube 36, is supported in a conventional, operative manner within the tube sockets 43 and 44, in line, and substantially parallel, with the radiation outlet 29 between the curved edges 34 and 35 of said rearward panels 30 and 32, through which the ultra-violet rays pass and through which the ultra-violet tube 36 is inserted in place within said lamp enclosure 21.

A base pan 50, which may be fabricated from a piece of reflective sheet metal, is removably placed upon the inside of the bottom sheet 12 between the back sheet 13, the rearward panels 30 and 32, and those portions of the upwardly turned rim 15 extending from the edges 27 and 28 of the bottom sheet 12. The said base pan 50 may be provided with integral flanges 51, adjacent to the back sheet 13 and the rearward panels 30 and 32, which flanges raise the pan up to the level of the upper edge of the rim 15. The lead wire 47 may conveniently pass from within the lamp enclosure 21, between the base pan 50 and the bottom sheet 12, and out of the cabinet through a suitable opening in the lower end of the back sheet 13.

A plurality of tetragonal shelves 52, are provided fabricated from any suitable material such as wire mesh, which is permeable or transparent to ultra-violet radiation. These have a suitable peripheral frame, and are placed within said outer cabinet 10 for the purpose of holding implements or material to be exposed to radiation from the ultra-violet tube 36.

The shelves 52 are removably supported along the rearward edge upon a plurality of shelf brackets 53 integral with, and spaced along, a pair of parallel support strips 54 and 55, which strips are affixed as by welding or riveting to the inside surface 18 of the back sheet 13. Said shelves are removably supported along their forward edges upon a plurality of shelf brackets 56 integral with, and similarly spaced along, a pair of parallel support strips 57 and 58, which strips are affixed as by welding or riveting to the rearward panels 30 and 32, respectively.

The tube support bracket 40 and the ultra-

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violet tube 36 are so positioned within the lamp enclosure 21 that the sterilizing radiation emitted by said tube 36 is restricted by the curved edges 34 and 35 to the area lying between the dotted lines 60 and 61.

The vertical edges 62 and 63 of the back sheet 13 may be curved towards the lamp enclosure 21, as shown in Figure 3, in order to further reduce the possibility that any of the ultra-violet radiation will escape from the confines of the outer cabinet 10 of which said back sheet 13 is a part. With this construction, it will be understood that all direct radiation and most of the indirect radiation emitted by said ultra-violet tube 36 must strike the inside surface 18 of the back sheet 13 before said radiation can escape from the said cabinet 10, and since this surface is made non-reflecting the actual escape, if any, of such radiation is negligible.

The shelves 52 and the inside of the cabinet 10 are readily accessible from either side between the forward most edges of the back sheet, curved parts 62 and 63, and the rearward most edges of the side panels 23 and 24.

Operation

The particular embodiment of the radiant sterilizer illustrated in the accompanying drawing is, as aforesaid, adapted for use where the back sheet 13 is substantially parallel with and adjacent to a wall or mirror 64 indicated in phantom in Figure 3.

The radiation lines 60 and 61 show that direct ultra-violet radiation can not escape past the back sheet 13 of the outer cabinet 10 and, by reflecting off of the mirror 64, return as reflected radiation. It will be observed that any radiation indirectly reflected off of the shelves or other parts within said cabinet will be so meager as to offer no discomfort to persons in the vicinity of the sterilizer.

The tube support bracket 40, which supports the ultra-violet ray or germicidal, tube 36, may be removed from the lamp enclosure 21, after the shelves 52 have been removed, by pinching the clip arms of the metal clips 38 and 39 together and thereby disengaging said clip arms from the curved edges 34 and 35 of said front panels 30 and 32. The electric conduit 46 between said bracket 40 and the switch 45 is long enough to permit the removal of said bracket.

One or both of the inside surfaces of the top sheet 11 and the top surface of the base pan 50 are coated and/or polished so that they will reflect the radiation of the germicidal tube 36, both downwardly and upwardly, respectively, upon those portions of the implements or material lying upon the shelves 52, which portions are not exposed to the direct radiation of said germicidal tube. The inside surface 18 of the back sheet 13 is either fabricated from, or coated with, a non-reflective material, as aforesaid, which absorbs the ultra-violet radiation of said germicidal tube 36.

Although the above mentioned drawings and description apply to one particular, preferred embodiment of the invention, it is not my intention, implied or otherwise to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

We claim:

1. In a partially enclosed, radiant sterilizer for sterilizing implements or material, the combina-

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tion comprising: a back sheet; substantially triangular, opaque, top and bottom sheets affixed to the upper and lower edges of said back sheet and a base pan positioned on and overlaying said bottom sheet, the facing surfaces of said top sheet and said base pan being reflective of ultra-violet radiation; a vertically elongated tube enclosure of cross section registerable with those portions of said top and bottom sheets remote from said back sheet and affixed perpendicularly therebetween, said tube enclosure having a rearward wall facing and parallel with said back sheet and having an elongated opening therein positioned perpendicular to said top and bottom sheets; a tube support bracket within said tube enclosure and having spring clips thereon engaging the facing edges of the portions of said rearward wall defining said opening for supporting said bracket in operating position; means on said bracket supporting an ultra-violet radiation tube within said tube enclosure, in line with said opening in said rearward wall, the spacing of said facing edges with respect to each other and the positioning of said tube with respect to said edges all being such that all direct tube radiation passing between said facing edges is interceptable by said back, top and bottom sheets; and means including a switch connecting said tube with a source of electrical energy; a pair of strips mounted on said back sheet, each thereof having a plurality of spaced shelf supporting brackets broken out therefrom; a pair of strips mounted on said rearward wall of said enclosure, one being on either side of said elongated opening therein, and having spaced shelf supporting brackets broken out therefrom all of said brackets being arranged in horizontal groups; a shelf of material permitting passage of ultra-violet radiation therethrough removably mounted on each group of said brackets said shelf being continuously accessible from two sides thereof; whereby a plurality of horizontally positioned shelves cooperate with a vertically arranged ultra-violet tube and articles placed on said shelves are thereby exposed to germicidal radiation over a major portion of their respective surfaces.

2. In a partially enclosed radiant sterilizer, the combination comprising: a cabinet having top and bottom sheets, one of whose opposing faces is reflective, and having a non-reflecting back sheet secured to said top and bottom sheets and perpendicular thereto; a tube enclosure secured at its extremities to said top and bottom sheets at respective points thereon remote from said back sheet, said tube enclosure having an opening on that side only which is directly opposite said non-reflecting back sheet; a removable tube support bracket removably supporting a germicidal tube within said tube enclosure, said tube being aligned with said opening and perpendicular to said top and bottom sheets, the direct radiation emanating from said tube through said opening being entirely interceptable by said back, top and bottom sheets; a pair of strips mounted on said back plate, each thereof having a plurality of spaced shelf supporting brackets broken out therefrom; a pair of strips mounted on said side of said enclosure opposite said back sheet, one strip being on either side of said opening, and having spaced shelf supporting brackets broken out therefrom all of said brackets being arranged in horizontal groups; a shelf of material permitting passage of ultra-violet radiation therethrough removably mounted on each group of said brackets said shelf being continuously ac-

cessible from two sides thereof; whereby a plurality of horizontally positioned shelves cooperate with a vertically arranged ultra-violet tube and articles placed on said shelves are thereby exposed to germicidal radiation over a major portion of their respective surfaces.

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