March 18, 1941. H. M. MUNCHERYAN 2,235,296

ELECTRIC STERILIZER USING RADIANT ENERGY

Filed May 31, 1939

Fig.1.

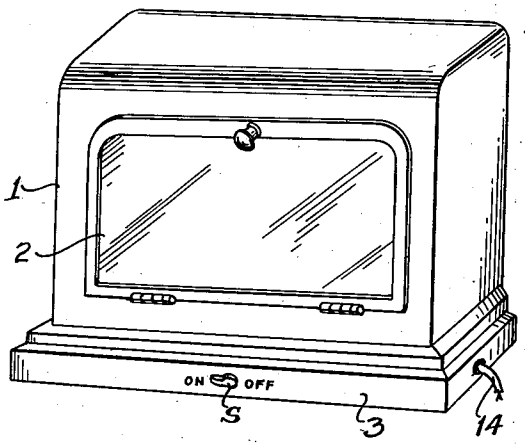


Fig.3.

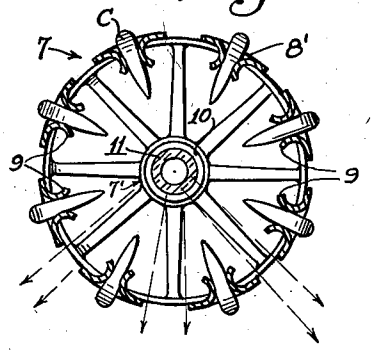


Fig.2.

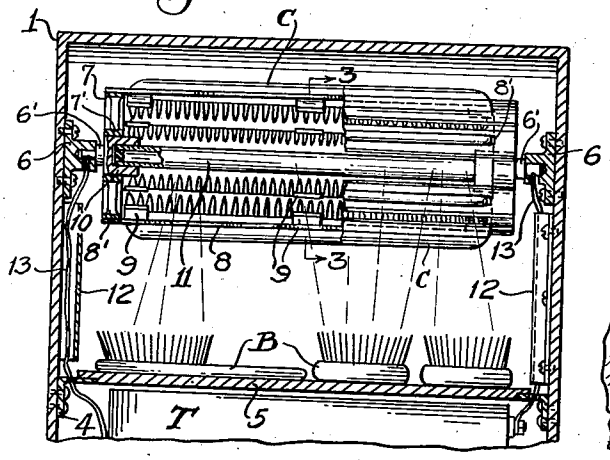
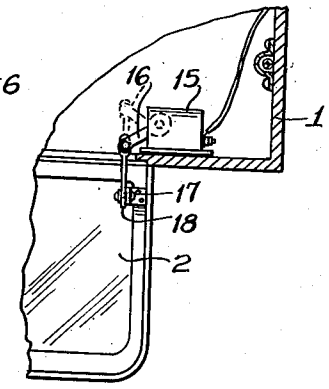


Fig.4.



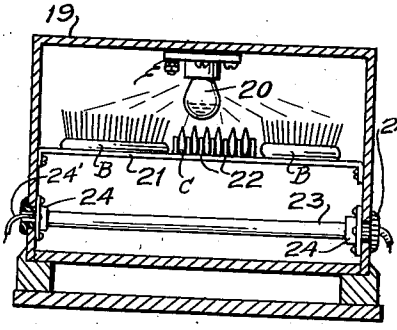
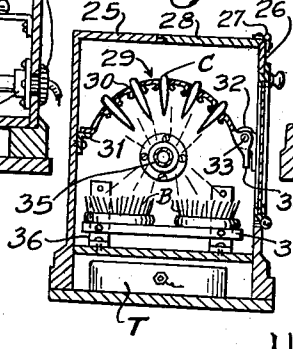


Fig.5.

Fig.7.



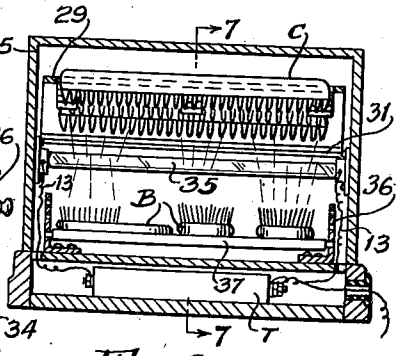


Fig.6.

INVENTOR.

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2,235,296

ELECTRIC STERILIZER USING RADIANT ENERGY

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Application May 31, 1939, Serial No. 276,642

9 Claims. (Cl. 250—52)

My invention relates in general to sterilizers and is concerned more particularly with an electric sterilizer in which ultra-violet radiation from a gaseous electric discharge device constitutes the principal germicidal agent.

It is a well-known fact that ultra-violet radiations of medium wave-lengths (1500 to 2500 Angstrom units) present lethal effects to many microorganisms such as fungi, mold growths, etc., and are definitely bactericidal, which phenomenon is utilized in the present invention in the effecting of sterilization of articles of public use particularly in medical centers, dental clinics, beauty parlors, barber shops, and the like. However, the effectiveness of the radiation for sterilization is dependent upon the manner of its use in that only the portions of the material in the direct path of the radiation are affected. Because of the difficulty of attaining this latter condition, the use of the ultra-violet rays as a germicide has met, in the past, with little or no success.

One of the principal objects of the present invention, therefore, is to provide a source of ultra-violet light and means whereby the articles to be sterilized can be completely exposed to the direct radiation.

Another important object of the invention is to provide the radiant source in a cabinet which is compact, practical, and inexpensive, and comprises removable trays and racks concentrically arranged about the ultra-violet source for the purpose of holding the articles to be sterilized in adequate positions.

A still further object of the invention is to provide an automatic switch whereby the current to the ultra-violet lamp is interrupted whenever the lid of the cabinet is opened for handling the articles in question, thus precluding, from a near-by person the disseminated radiation which would otherwise be harmful to unprotected eyes or skin even for short exposures.

Still another object is to provide a device of the class described having means for stepping up the voltage to that required for the normal operation of the ultra-violet lamp, thus making it possible to use current from the usual 115–120 volt alternating current lines.

Since the effectiveness of the ultra-violet rays becomes more pronounced in a dry atmosphere of air, a further object of the invention is to provide a source of radiant heat such as from an incandescent lamp or from a coil of conductor wire having relatively a high resistance. This heat further decomposes the ozone produced by the ultra-violet rays.

Though the device may be used for sterilizing surgical or dental instruments, drinking cups, glass-ware, etc., its use is particularly adapted in the present invention to disinfecting hair-combs, brushes, hair-pins, and other articles of public use that may communicate germs from one person to another, producing dermal or other organic infections.

With the foregoing and other objects in view, my invention consists of certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing, in which:

Fig. 1 is a general perspective view of the sterilizer cabinet embodying my invention,

Fig. 2 represents a fragmentary vertical section of the sterilizer, showing the arrangement of the ultra-violet source, the trays and the articles to be sterilized,

Fig. 3 is a cross sectional view of the comb-carrying rack taken on the line 3—3 of Fig. 2,

Fig. 4 is a fragmentary horizontal sectional view of the cabinet showing the door-operated switch mechanism,

Fig. 5 is a vertical sectional view of a modified form of my invention,

Fig. 6 is a vertical sectional view of another modified form of the invention, and

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now to the drawing, the device comprises a cabinet 1, which may be formed of glass, wood, metal, Bakelite, or other suitable plastic material. This cabinet is provided with a transparent front door 2 hinged near base 3 which latter houses a step-up transformer T. The walls of the housing 1 with the exception of the wall having the opening that is closed by the door 2 are imperforate so that when the door is closed the chamber within the housing is practically air-tight, such provision being particularly effective in bringing about complete sterilization of the articles that are subjected to ultra-violet radiations within the cabinet. Mounted on the inner surface of the cabinet walls on either side is a bracket 4 which supports a sliding shelf 5. This carrier serves to hold the articles to be sterilized in the direct radiation of the ultra-violet tube 11 attached at its terminal ends by means

of suitable sockets or hubs 10 supported by brackets 6 fastened to the opposite walls of the cabinet.

Concentrically mounted around the ultra-violet tube 11 is a rotatable rack 7 having tie bars 8 and slots 8', and clips 9 for holding the combs C or the like to be sterilized in substantially radial positions with respect to the ultra-violet source. The tie bar 8 has three clips 9, one at each end and one at the center. This arrangement makes it possible to attach articles of various sizes to the rack 7 which rotates on the shaft 6' when it is desired to insert or remove the combs C from the rack. The tie bars 8 are spaced one from the other so that the ultra-violet rays can pass between them and irradiate the brushes B placed on a shelf-like support or rack 5. If desired, the rack 7 may be rotated slowly by means of an electric motor (not shown) arranged adjacent the shaft of this rack.

12 designates a guard plate through which the electric conductor 13 is led from the transformer secondary to either end of the ultra-violet tube, and 14 is a cord carrying the current to the sterilizer from the mains line.

Built near the base of the cabinet door 2 is an automatic switch 15 actuated by means of a switch arm 16 having a pivoted link 18 fastened to the bracket 17 on the rim of the said cabinet door. It will be noted that when the main switch S is at "on" position and the door of the cabinet is closed, the switch 15 will close the circuit to the ultra-violet lamp, but when this door is opened, as during handling of the articles in the sterilizer, the circuit will be interrupted, consequently de-energizing the ultra-violet tube. The purpose of this latter arrangement can be explained by considering the fact that ultra-violet rays are harmful to the eye and skin, and therefore, by providing an automatic switching mechanism at the door, exposure to the radiation inadvertently is entirely eliminated.

In a modified construction of the invention, 19 is the sterilizer cabinet having an ultra-violet lamp 20 attached interiorly to its top wall, and a removable open wire rack 21 for holding combs, hair-pins, and hair-brushes in an exposing position to the ultra-violet radiation.

22 is a comb rack which retains a number of combs C and permits their exposure to the direct radiation of the ultra-violet lamp. The exposure to the radiation is afforded by arranging the side of individual combs having their teeth perpendicularly toward the ultra-violet lamp so that all parts of the teeth are in the path of the radiation. Located centrally underneath the wire rack 21 is an electric incandescent tube 23 which furnishes illumination to the interior of the cabinet, and further, by virtue of its heating of the atmosphere of air within the cabinet, it decomposes any ozone gas that may be produced in the said cabinet by the ultra-violet rays during the operation of the ultra-violet tube. Tube 23 is secured to the cabinet by a bracket 24 which also serves to conduct the current to the incandescent filament from either end of said tube.

However an ordinary 110 volt incandescent bulb may be used in place of the tube 23 and if desired such a bulb may be utilized in the forms of apparatus illustrated in Figs. 2 and 6.

In still another modified construction of the device, 25 designates the cabinet proper, 26 is a hinged front door which comprises a portion of the front wall and also a portion 28 of the top of the cabinet 25 and when opened it flattens out by means of the hinges 27. The lower edge of the door that forms a portion of the front wall of the cabinet is connected to the lower portion of said front wall by a suitable hinge or hinges and thus when the door comprising the parts 26 and 28 are open, a flat horizontally disposed shelf is provided in front of the cabinet and that portion of this shelf comprising the part 28 serves as a convenient support for articles that are being placed in or removed from the rack 29 that is carried by that part of the door that forms a portion of the front wall of the cabinet. The comb rack 29 holds a number of combs C in resilient strips 30 positioned in arcuate relation about the ultra-violet tube 35. Said comb rack 29 is supported at one end on an angle support 31 and at the other end it is swivelly attached to the cabinet door 26 by means of the hinged bracket 32 through which the pin 33 passes, and around which pin the rack 29 rotates.

The stop lug 34 supports the rack 29 in upright position when the door 26 is open. 36 is a shelf bracket having apertures so that a shelf 37 can be adusted to any desired position by simply moving it either up or down and attaching it to the bracket 36 at the desired level. Said adjustable shelf primarily serves the purpose of holding brushes, and hair-pins or it may be constructed so as to receive and hold combs by including a rack similar to the rack 22 illustrated in Fig. 5.

It is obvious that my invention is susceptible to various changes and modifications in construction without departing from the spirit of the invention or the scope of the appended claims, and I accordingly claim all such forms of the device to which I am entitled.

I claim as my invention:

1. In an ultra-violet sterilizer comprising a closed cabinet, a source of ultra-violet rays within said cabinet, and a door for permitting the insertion or removal of articles to be sterilized; an automatic electric switch at the base of said door and operated thereby, a carrier means for holding articles for sterilization and pivotally attached to the inside face of said door, and a hinged portion for completing the top enclosure of said cabinet when the said door is closed and for affording the easy handling of said articles on said carrier means when the door is swung open.

2. In an ultra-violet sterilizer comprising a closed sterilizing chamber, a source of ultra-violet radiation within said chamber, a door for permitting the insertion or removal of articles to be sterilized; an automatic electric switch at the base of said door, means located wholly within said chamber for holding articles for sterilization disposed in arcuate relation about said ultra-violet source and pivotally attached to the inside face of said door; and a hinged portion for completing the top enclosure of said cabinet when said door is closed, said hinged portion forming a shelf when the door is swung open, making the sterilized articles accessible from outside the said chamber.

3. In an ultra-violet sterilizer having a closed cabinet including a door connected to said cabinet so as to form a support for articles that are placed within or removed from the sterilizer when said door is open, a source of radiant energy as the principal sterilizing agent, a removable rack positioned wholly within said cabinet and carried by a part of said door so as to be

withdrawn from the cabinet when the door is open, a plurality of means on said rack for receiving and holding individual articles to be sterilized in arcuate relation about said radiation source, each of said article receiving and holding means including a pair of resilient flanges arranged so as to hold the articles to be sterilized in the direct path of radiation from said source of radiant energy and a second article supporting rack disposed wholly within the cabinet opposite to the first mentioned rack and adjacent to said radiation energy.

4. In an ultra-violet sterilizer, a cabinet, a door therefor, a source of radiant energy within said cabinet, an arcuate rack removably positioned within said cabinet adjacent said source of radiant energy, one end of which rack is supported by the door of the cabinet, said rack having a plurality of pairs of spaced resilient fingers arranged so as to hold the articles to be sterilized in the direct path of radiation from said source of radiant energy and a second article supporting rack adjustably mounted and removably positioned within said cabinet adjacent the source of radiant energy therein.

5. In an ultra-violet sterilizer, a closed cabinet, a source of radiant energy within said cabinet, a door normally closing an opening in one of the walls of the cabinet, a rack removably arranged within said cabinet and supported by said door and one of the walls of said cabinet adjacent the source of radiant energy and said rack having a plurality of pairs of spaced resilient fingers for receiving and holding articles to be sterilized in the direct path of radiation from said source of radiant energy.

6. An ultra-violet sterilizer as set forth in claim 5 and with a second rack removably and adjustably arranged within said cabinet adjacent said source of radiant energy.

7. In an ultra-violet sterilizer, a cabinet, a two part door thereof, one part of said door forming a part of the front wall of the cabinet, the other part of the door forming a part of the top of the cabinet, a source of radiant energy within said cabinet and an arcuate rack supported on the inside of the part of the door that forms a portion of the front wall of the cabinet and which rack occupies a concentric position with respect to the source of radiant energy when the door is closed.

8. An ultra-violet sterilizer as set forth in claim 7 and with a support on the inside of the rear wall of the cabinet for the free end of said arcuate rack.

9. An ultra-violet sterilizer as set forth in claim 7 and with article supporting means adjustably supported within the cabinet on the opposite side of the source of radiant energy from said arcuate rack.

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