

Dec. 24, 1968

J. J. E. A. DECUPPER

3,418,069

ULTRA-VIOLET RAY STERILIZERS

Filed Dec. 22, 1965

2 Sheets-Sheet 1

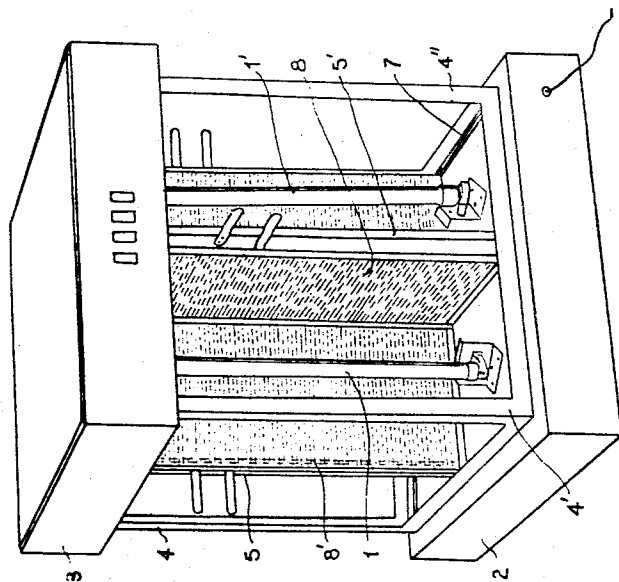


FIG. 2

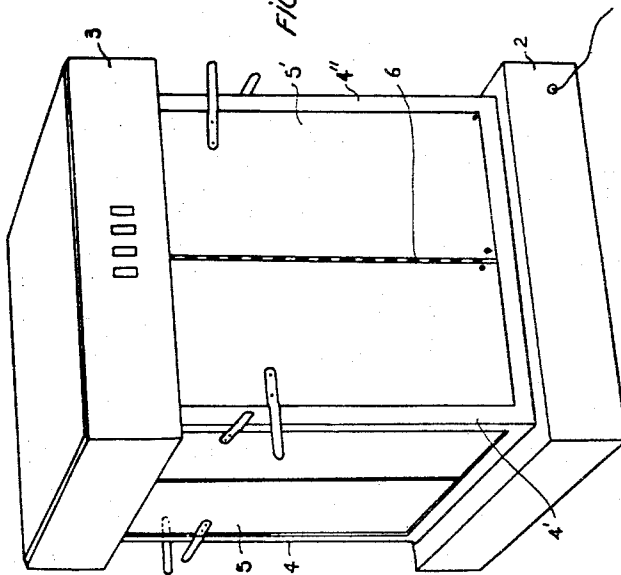


FIG. 1

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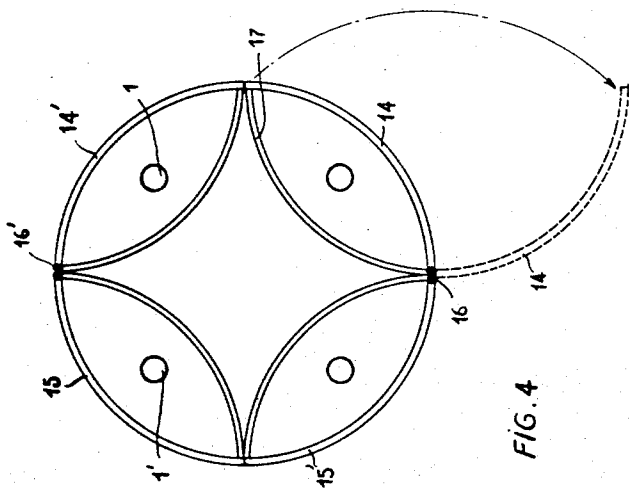


FIG. 4

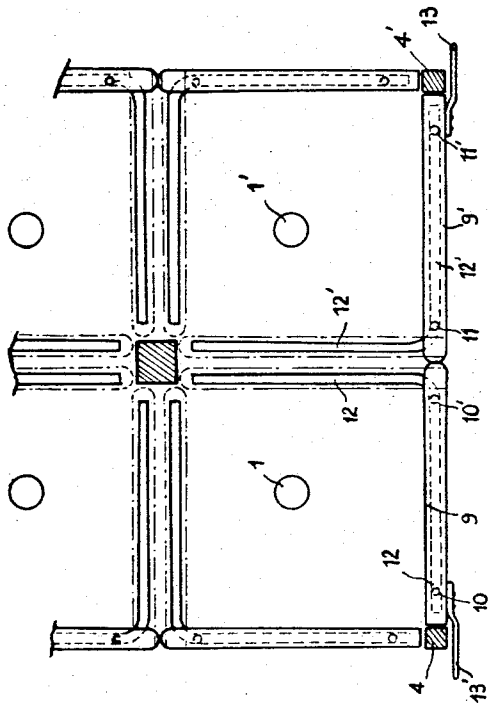


FIG. 3

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3,418,069

ULTRA-VIOLET RAY STERILIZERS

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7 Claims. (Cl. 21—74)

This invention relates to improvements for sterilizing the atmosphere by ultra-violet rays.

The oxidising action of ultra-violet rays is currently used for the destruction of organic germs which are dispersed in the atmosphere; the emitting tubes for such rays are disposed in installations which may be fixed or movable and used for sterilizing localities such as operating theatres, wards, sterile spaces, etc.; however the ultra-violet rays being, as the result of their destructive action on organic cells, somewhat dangerous for human beings, the fixed installations should comprise screens intended to insure that the emitted radiations do not reach the users. The mobile installations formed generally by one or several ultra-violet tubes mounted on a support comprising also fixed or articulated screens permitting the use of the apparatus either in the presence of the users, the screens being then in position or without anyone present, the screens being then retracted or in the open position.

In ultra-violet ray emitting apparatus of the movable type, the protective screens are generally formed by shutters which are articulated longitudinally on the body of the apparatus; in the closed position these shutters form screens preventing the ultra-violet radiation from spreading into the space and reaching the persons therein; in the open position the shutters are externally retracted to enable the ultra-violet rays to be emitted freely. The disadvantage of the device thus formed resides in that the shutters in the open position continue however to offer a certain surface opposing the passage of the radiation, which is particularly noticeable when the shutters are dish or curved to mate with the general cylindrical form of the apparatus; the blind angles thus formed are objectionable when it is desired, as is generally sought in the use of such apparatus, to irradiate completely a room. Moreover the shutters described above when they are in the open position extend laterally and make the apparatus considerably more cumbersome.

The sterilising apparatus for emitting ultra-violet rays in accordance with the invention overcomes these drawbacks, it comprises protective screens which are remarkable in that they are provided with means enabling them to be folded or retracted in the interior of the apparatus between the ultra-violet emitting tubes.

The advantage obtained by the apparatus in accordance with the present invention is that the shutters become stowable in the interior of the apparatus and no longer represent an additional external encumbrance in the open position, with a view to direct irradiation of the space; moreover the shutters situated between the lamps in the open position do not cause any dead angle in the irradiation.

But the inventor has besides obtained by this device a remarkable advantage in permitting the internal surface of the protective shutters to play the role of reflector when the shutters are in the open position; to this end the inventor has arranged to provide the internal face of the said shutters with an appropriate covering constituted by polished metal applied on a flat or preferably goffered support ensuring a better dispersion of the reflected rays. An important characteristic of the apparatus in accordance with the invention is formed by the reflective covering of the inner face of the protective shutters.

An embodiment of the invention will now be described

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by way of example with reference to the accompanying drawings, in which:

FIGS. 1 and 2 represent two perspective views of a preferred embodiment of the apparatus in accordance with the invention; FIG. 1 showing the apparatus with the shutters closed and FIG. 2 showing the apparatus with the shutters open.

The apparatus here consists essentially of four tubes 1, 1' which emit ultra-violet radiation and are disposed vertically between a base 2 and a roof 3 fixed together by uprights 4, 4', 4''. The apparatus is in the form of a prism of square section; on each of its four sides are disposed protective screens 5 and 5'; each screen comprises two panels articulated to each other about the vertical axis of the apparatus; the articulation 6 is thus situated in the centre of the shutter; at the four corners of the shutters are provided rollers disposed along the axis of the apparatus and placed in guide rails 7, themselves situated on the periphery of the base 2 and the roof 3 of the apparatus; the axis 6 of articulation of the two panels forming each shutter can equally be prolonged at its two ends by two rollers which are displaceable in guide rails radially mounted in the base and the roof of the apparatus.

The opening of a shutter thus takes place by folding back on each other the two panels which compose it; the articulation 6 is pushed into the interior of the apparatus and the rollers associated with the guide rails described above make the shutter 5', when it is completely folded on itself, occupy a radial position in relation to the axis of the apparatus; it is then situated between two ultra-violet emitting lamps 1 and 1', so that the assembly of the four shutters when folded forms a cross containing in the interior of each of its angles which it determines an ultra-violet lamp.

With the outer faces of the shutter folded on each other, the inner faces 8 and 8' appear in the open position of the shutters; these surfaces are covered with an appropriate metal reflecting the ultra-violet rays and they should advantageously have a surface comprising more or less regular embossments thus ensuring better orientation and more rational dispersion of the rays in the midst of the spaces to be sterilised.

One could, as shown in FIGURE 3, without departing from the scope of the invention, construct a retractable shutter formed of two independent portions 9 and 9', in which the retraction movement and folding of the two panels could be controlled by rollers 10, 10', 11, 11' and rails 12, 12', having endings to give to the two folded faces of the shutter the radial position described above, the rail has then preferably an elbowed form. The outer edges of the shutters are advantageously provided with handles 13, 13' for moving them.

In a third form of embodiment shown in FIG. 4, the apparatus is cylindrical and the shutters are formed by four curved panels, 14, 14', 15, 15', each panel or shutter representing the surface of quarter of a cylinder and the assembly of the four shutters in the closed position surrounds and obscures the apparatus; each shutter can turn freely about a pin 16, 16' situated in one of its edges; the pin of rotation is engaged at each end in two rails 17 in the form of a quarter of a circle situated one on the base and the other in the roof of the apparatus and in a symmetrical position to that occupied by the shutter in the closed position. Opening of the shutter takes place by rotation of this latter about its pin, after rotation of 90° the axis of rotation is spaced along the guide rails 17 and reaches the opposite end of the rail; the shutter has then turned to 180° and occupies in the open position a position which is symmetrical to its original or closed position; the internal face of the shutter surrounds over a

quarter of a circle the ultra-violet ray lamp and as has been described above this inner face is provided with appropriate covering playing the roll of reflector for the rays.

What I claim is:

1. Apparatus for sterilising the atmosphere by the emission of ultra-violet rays comprising a plurality of vertical tubes for the emission of ultra-violet rays arranged between a lower base and an upper cover and several movable protective shutters, a reflecting metal coating arranged on the inner face of said shutters, means to displace said shutters into the interior of the apparatus when open, and to position same between the tubes, in such a manner that the inner face of the shutters provided with a reflecting metal coating is exposed to the emitting tubes.

2. Apparatus according to claim 1, whereas each shutter is formed by two independent similar panels provided with guiding rollers, and guide rails engaging said rollers being arranged on the base and cover of the apparatus to control the movement of the half-shutter towards a radial position relative to the axis of the apparatus.

3. Apparatus according to claim 1, having a cylindrical form and comprising four shutters each representing the surface of a quarter of a cylinder, each shutter comprising along each upper and lower edge an articulation pin associated with each of its corresponding upper and lower rail having the form of a quarter of a circle, and arranged on the base and on the cover of the apparatus respectively, said rails turning their concavity towards the exterior and being disposed symmetrically with respect to the shutters when closed.

4. Apparatus according to claim 1, wherein the reflecting coating of the inner faces of the shutters has an irregular surface ensuring general diffusion of the ultra-violet rays.

5. Apparatus according to claim 1, wherein the shutters are provided with handles and with resilient locking means to maintain said shutters in closed and open positions.

6. Apparatus according to claim 1, having a square-

section prismatic form and comprising four ultra-violet rays emitting tubes and four shutters one at each of its faces, each shutter being constituted by two similar panels which are articulated to each other along their inner vertical edge about the vertical axis of the shutter, whereas means are provided to guide the outer edges of said panels in the place containing the face of the apparatus when folding the shutter together by pushing said articulation inwardly towards the axis of the apparatus.

7. Apparatus according to claim 6, wherein the guiding means associated with each shutter comprise guide rails arranged on the base and on the cover perpendicularly to each face of the apparatus, an upper and lower pin engaging said rails and protruding upwardly and downwardly from the central articulation of each shutter, whereby said articulation is moved in a position very close to the centre of the apparatus when the shutters are folded, and guiding members provided on the outer upper and lower edge of each shutter and rails arranged near each face of the apparatus in parallel relation with said faces respectively and cooperating with said guiding members.

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