

- [54] **TRAY FOR LIQUID STERILIZERS**
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- [73] Assignee: **Aquatron Corporation (Aust.) Pty. Limited**, Marrickville, New South Wales, Australia
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 May 19, 1970 Australia .....1245
- [52] U.S. Cl. ....**250/43**
- [51] Int. Cl. ....**G01n 21/26**
- [58] Field of Search.....250/43, 49

[56] **References Cited**

**UNITED STATES PATENTS**

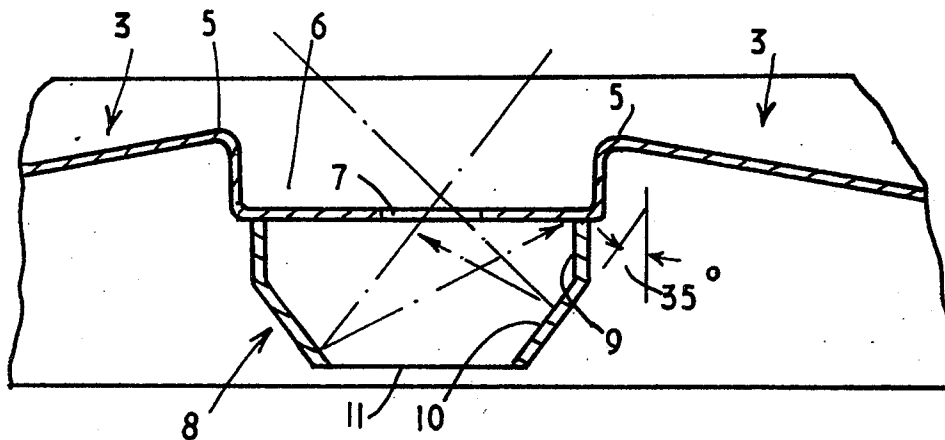
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|-----------|---------|------------------|----------|
| 2,485,267 | 10/1949 | Ellner .....     | 250/43   |
| 2,989,632 | 6/1961  | Olson et al..... | 250/43 X |
| 2,619,894 | 12/1952 | Knepper .....    | 250/43 X |
| 1,910,791 | 5/1933  | Coppel .....     | 94/1.5   |

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*Attorney*—Emory L. Groff and Emory L. Groff, Jr.

[57] **ABSTRACT**

A tray for use in sterilizing liquid by U.V. rays, the tray having an outlet and a reflector mounted on the tray adjacent the outlet to reflect the sterilizing U.V. rays onto the underside of the tray around the outlet.

**8 Claims, 11 Drawing Figures**



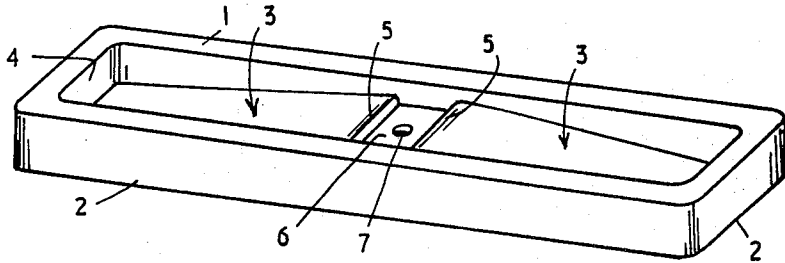


FIG. 1.

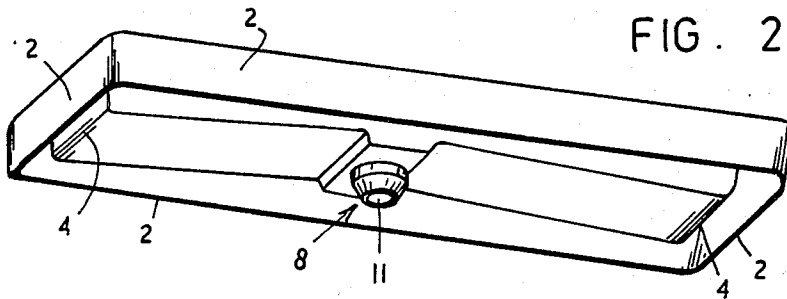


FIG. 2.

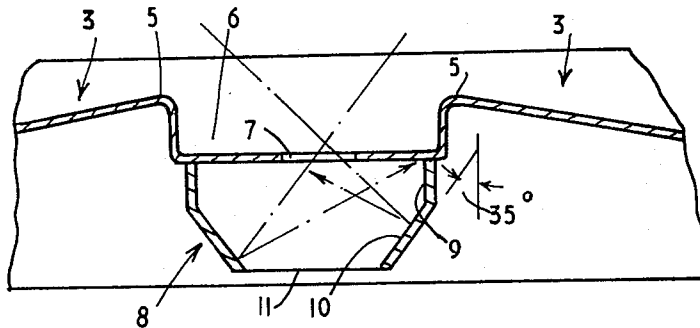


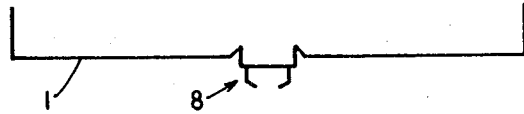
FIG. 3.

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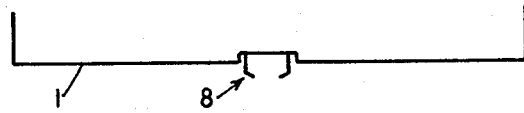
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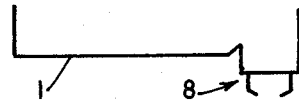
FIG.



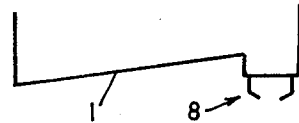
4a.



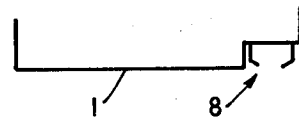
4b.



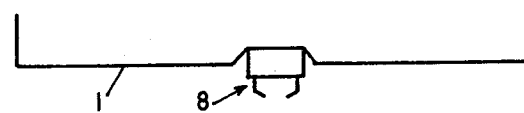
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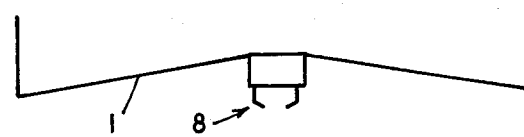
4d.



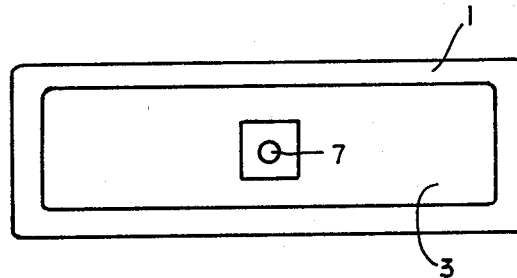
4e.



4f.



4g.



4h.

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## TRAY FOR LIQUID STERILIZERS

This invention has been devised to provide a tray for liquid to be sterilized by ultra violet rays.

In our Australian Pat. No. 259,734, a water sterilizer has been disclosed which incorporates a removable tray in which the water is sterilized from above by ultra violet ray radiation. The removability of the tray is an important feature as this facilitates cleaning of the tray.

For the maintenance of a sterile product, contamination must be avoided during the transfer of the product from the sterilizer to a container therefor. This transfer is very often more difficult to effect than the actual sterilization of the product in the sterilizer.

The discharge from sterilizing trays has, in the past, been through a pipe. The difficulties in maintaining such a pipe sterile are at once obvious. The deletion of the pipe and the formation of a liquid discharge hole, without a pipe, in the bottom of the liquid trough of the tray was originally seen as a solution to this problem. However, in experiments it was found that beads of liquid can form around the edge of the hole in a position out of line with the sterilizing medium, that is, the U.V. radiation. These beads are a possible source of unsterile liquid as they are recontaminated by contact with the tray underface, and they could contaminate the otherwise sterile contents of the receptacle collecting liquid from the sterilizing tray if they were to enter the receptacle.

It would be possible to provide supplementary sterilizing means below the tray in a sterilizing unit and so largely overcome the above problem. Practical difficulties, however, rule out such an arrangement. For example, additional sterilizing means, e.g. U.V. tubes would be required, the overall size of the sterilizing unit would have to be increased and obtaining efficient radiation on the underface of the tray, which is partly obscured by a container for the liquid, would be a further problem.

A tray according to the present invention comprises a trough, weir means in the trough, a liquid discharge hole through the bottom of the trough downstream from said weir means and reflector means mounted on the tray to intercept U.V. rays originating above the trough and passing through said hole, said reflector means being shaped and dimensioned to reflect the U.V. rays incident thereon against the underside of the tray at least around said hole and being located in a position to avoid liquid discharged from said tray contacting said reflector means.

By reflecting the ultra violet rays in the manner described, any beads of liquid which might hang by surface tension on the edge of the hole or on the underface of the depressed portion adjacent the hole are sterilized by the reflected ultra violet rays.

The invention is described with reference to the accompanying drawings in which

FIG. 1 is a perspective view of the tray from above;

FIG. 2 is a perspective view from below;

FIG. 3 is a fragmentary enlarged view of the tray reflector; and

FIG. 4a to h are schematic views of various forms of tray according to the invention.

As illustrated in FIGS. 1 to 3, the tray has a top surface 1, a turned down rim 2 and a trough 3 formed in the top surface 1. The trough 3 decreases in depth from

its ends 4 to two weirs 5 between which is a depressed area or well 6 from which liquid can discharge through a sharp edged circular hole 7. It will be understood that the trough need not have a sloping bottom.

To the underside of the well 6 is fixed by one end a tubular reflector 8 which is substantially concentric with but larger than the hole 7. The reflector 8 has an internal polished surface 9 and is of short length with an inwardly downwardly inclined portion at its other lower end to provide an angular reflective shoulder 10.

From the dotted lines in FIG. 3 representing U.V. rays, it will be seen that rays incident upon the shoulder 10 will be reflected back onto the underface of the well 6 at least around the hole 7 and in fact some rays may be reflected back through the hole 7. With the multiplicity of rays resulting from blanket radiation of the liquid in the tray, some pass through the liquid in the well and hole 7 and these are sufficient when reflected to render the irradiated area of the underface of the well sterile.

In a presently preferred arrangement the hole 7 has a diameter of five-eighths inch the reflector 8 has an internal diameter of  $1 \frac{5}{8}$  inch and the shoulder 10 lies at an angle of  $35^\circ$  to the central axis of the cylinder 8. The shoulder 10 terminates in an opening 11 of  $1 \frac{1}{16}$  inches diameter.

The opening 11 of the reflector is desirably dimensioned to form a protecting barrier against the possibility of the neck of a receptacle entering the reflector 8 sufficiently to contact the underface of the well 6. It is also made sufficiently large that liquid discharging from hole 7 will not contact the reflective surface of extension 10.

It is to be understood that the design of the reflector has to be in accord with certain factors inherent in the equipment with which the tray is to be used. For example, a sterilizer having a plurality of irradiating tubes will require a reflector which is different from that which is required if a single tube is provided as the angles at which the rays pass through the hole 7 would be different. It is important that the reflector be shaped to redirect rays as uniformly as possible and thus avoid any "shadows" of low radiation intensity. For this purpose, a reflector of rectangular cross-section may in some circumstances be found more effective than the circular reflector illustrated.

Referring now to FIGS. 4a to 4g, it will be seen that various tray configurations may be adopted with equal effect. FIG. 4h is a plan view of the tray 4b or 4f or 4g, where the weir means does not extend fully across the trough.

I claim:

1. A tray for U.V. transparent liquid which is to be sterilized by ultra violet rays, said tray comprising a trough, a liquid discharge hole through the bottom of the trough and reflector means mounted on the tray to intercept U.V. rays originating above the trough and passing through said hole, said reflector means being shaped and dimensioned to reflect the U.V. rays incident thereon against the underside of the tray at least around said hole and being located in a position to avoid liquid discharged from said tray contacting said reflector means.

2. The tray claimed in claim 1 having weir means to maintain liquid in the trough to a pre-determined depth

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and wherein the hole is down stream from the weir means.

3. The tray claimed in claim 2 wherein said weir means divides said trough into a plurality of liquid holding areas.

4. The tray claimed in claim 2 wherein said weir means is comprised of two weirs and said hole is disposed between said weirs.

5. The tray claimed in claim 4 wherein said hole is disposed in the floor of a well located between said weirs.

6. The tray claimed in claim 2 wherein said trough in-

creases in depth as it extends away from said weir means.

7. The tray claimed in claim 1 wherein said reflector means is a tubular member substantially co-axial with said hole and provided with an internal shoulder surface which is angled inwardly and away from said tray, at least said shoulder surface being reflective.

8. The tray claimed in claim 7 wherein said shoulder surface is disposed at an angle of 35° to the common axis of said hole and said tubular member.

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