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D. S. STEVENS ET AL

2,028,256

STERILIZING DEVICE

Filed July 12, 1934

3 Sheets-Sheet 2

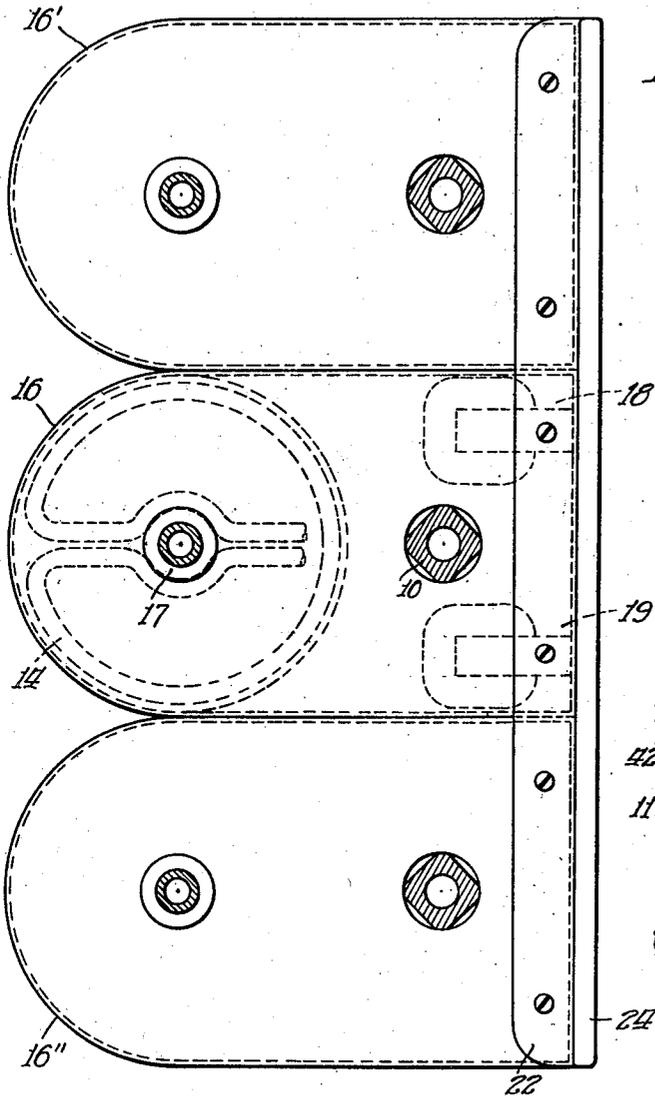


Fig. 2

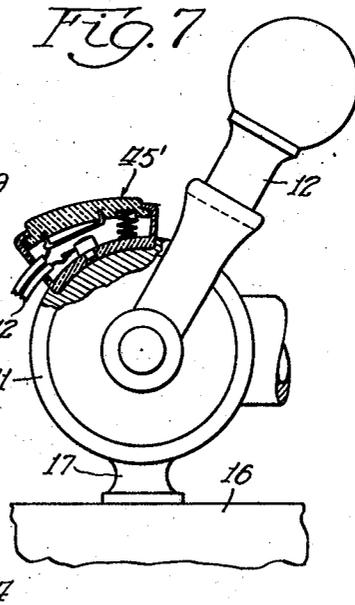


Fig. 7

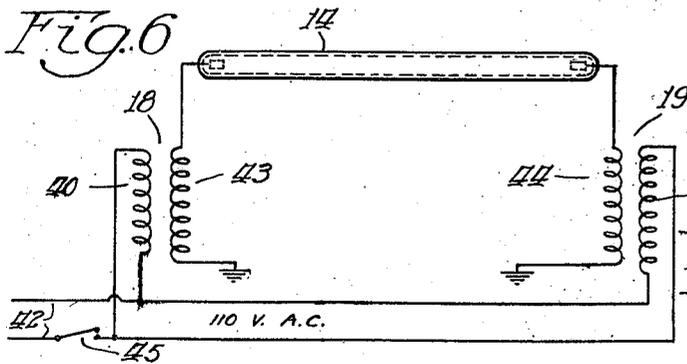


Fig. 6

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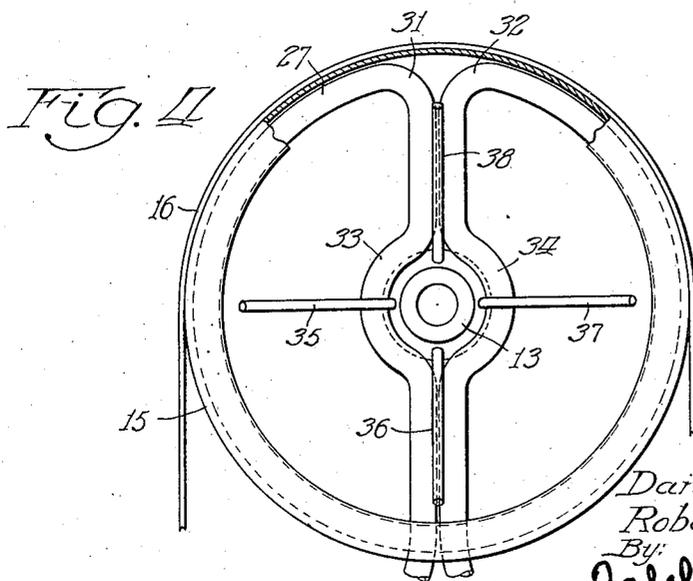
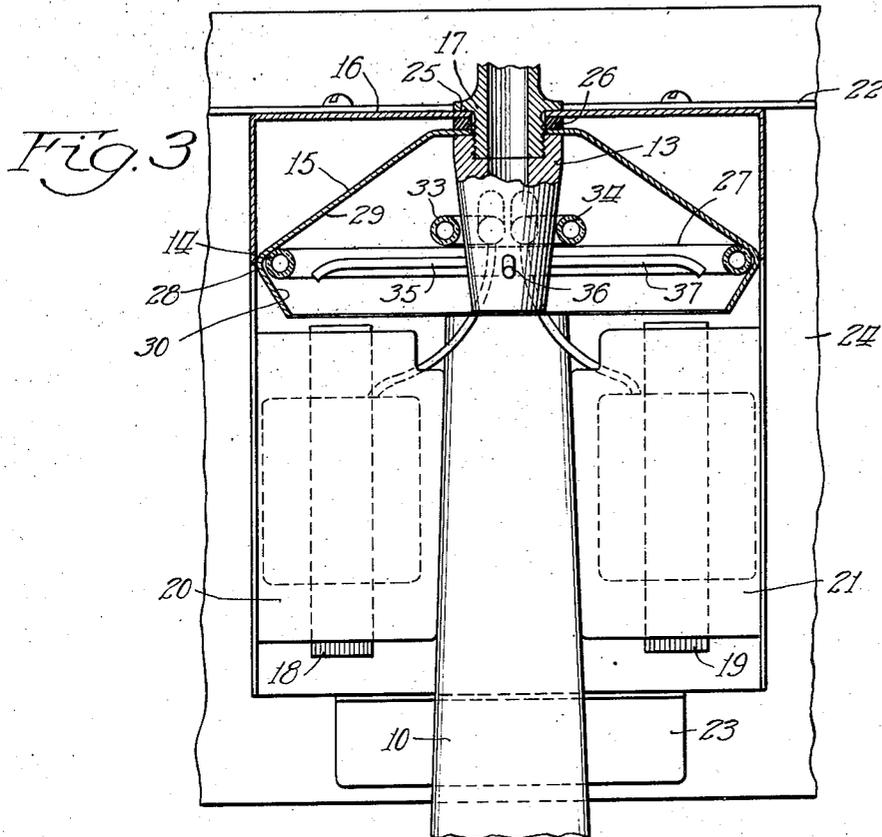
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# UNITED STATES PATENT OFFICE

2,028,256

## STERILIZING DEVICE

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Chicago, Ill.

Application July 12, 1934, Serial No. 734,760

23 Claims. (Cl. 225—23)

Our invention relates to the combination with a dispensing nozzle for dispensing beverages and the like and a means for sterilizing the receptacle into which the beverage is dispensed.

5 It is the purpose of this invention to provide a combination dispenser and sterilizer whereby the mere act of placing the glass or similar drinking vessel in position beneath the dispensing nozzle and filling the glass from the nozzle insures sterilization of the glass both on the inside and 10 outside. This combination thus insures the drinker of the beverage against diseases obtained by passing the germs from one person to another on the rim of the drinking glass.

15 The device is primarily designed for use on draft arms such as are found on soda fountains. However, it is not so limited and may be used in conjunction with dispensing nozzles of various types to protect the public health against transmission of diseases due to incomplete sterilization 20 of the drinking vessels used.

25 It is a further purpose of this invention to provide in combination with a dispensing nozzle or arm a source of irradiation in such position as to completely flood both the inside and outside upper part of a drinking vessel held beneath the nozzle with sterilizing radiations.

30 A further and more specific purpose of our invention is the provision in a device of this character of means whereby the draft arm of a soda fountain or mere dispensing device or the like may be caused to support a complete sterilizing unit.

35 Our invention contemplates also the provision in a device of the character described of means whereby the energy necessary for sterilization is not turned on except when the vessel to be used is in position to receive the liquid dispensed from the nozzle.

40 Our invention contemplates further the provision of a device of this character wherein the irradiating device may also serve as a display mounting for a suitable advertising display device.

45 Our invention further contemplates the provision of a device of this character wherein the sterilizing device is normally off but may be turned on from the dispensing valve control.

50 Other and more specific objects and advantages of the invention will appear as the description proceeds in connection with the accompanying drawings wherein the preferred form of the invention is shown. It is to be understood, however, that the drawings and description are illustrative only and are not to be taken as limiting

the invention except in so far as it is limited by the claims.

In the drawings—

Fig. 1 is a side elevation of a draft arm embodying our invention;

Fig. 2 is a top plan view partly in section showing how the device is applied to a multiplicity of draft arms arranged side by side;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary view looking upwardly at the dispensing nozzle certain parts being broken away to show the inner construction;

Fig. 5 is an elevation of the display device;

Fig. 6 is a wiring diagram showing the electrical connections; and

Fig. 7 illustrates a modified form of control which may be used for controlling the sterilizing device.

Referring now in detail to the drawings, the invention is shown as embodying a draft arm 10 having the usual valve 11 controlled by the valve handle 12 and carrying a suitable nozzle 13. The sterilizing device in the present instance consists of the tube 14 which is supported in the reflector 15, there being a cover and supporting frame 16 over the reflector. Both the cover 16 and reflector 15 are secured by means of the nozzle 13 to the down-turned end of the draft arm (see Fig. 3). The frame 16 preferably projects downwardly along the draft arm, and, on opposite sides of the draft arm, carries a pair of transformers such as 18 and 19 which transformers are covered by the cover plates 20, 21. On the face of the frame 16 that projects toward the customer, we provide the brackets such as 22 35 and 23 which carry a display plate 24 which may be utilized for any suitable advertising display.

In certain instances, particularly in soda fountain work, a number of draft arms are located side by side in which case a series of frames such as 16, 16', and 16'' may be placed side by side with a single display device such as 24 and brackets 22 connecting them all together to form a multiple sterilizing unit. The construction of the three individual units 16, 16', and 16'' will, of course, be alike in such event in so far as the sterilizing mechanism is concerned.

The sterilizing unit proper is secured in position by means of the nozzle 13 in the following manner: The downturned end 17 of the draft arm has a shoulder at 25, and below, the shoulder is screw-threaded to receive the screw-threaded upper end of the nozzle 13. The frame 16 fits directly against the shoulder 25, then a layer of packing or washer such as 26 is placed around the screw- 55

threaded end 17, and the reflector 15 fits against this washer 26. Nozzle 13 screws up against the reflector 15 and holds the parts assembled.

The gaseous conduction tube 14 is supported in the reflector 15, the outer annular portion 27 thereof being located directly in the angle at 28 between the upper downwardly diverging reflecting surface 29 and the lower downwardly converging reflector surface 30. The tube is bent as shown at 31 and 32 in Fig. 4 toward the center of the reflector, and the two sections are bowed outwardly as indicated at 33 and 34 around the nozzle 13 providing a substantially annular source of irradiation. Then the free ends of the tube pass out through the reflector above the portion 27 and are connected by suitable leads and electrodes to the transformers 18 and 19 as shown in the wiring diagram in Fig. 6.

The nozzle 13 below the portions 33 and 34 is provided with a series of radiating arms 35, 36, 37, and 38, which arms extend out close to the outer portion 27 of the tube to form a protecting spider for preventing the glass 39 or other drinking vessel from being pushed up into contact with the tube itself.

This gaseous conduction tube 14 is preferably filled with a gaseous mixture capable of giving a high percentage of ultra-violet radiations, the sterilizing effect of which is well known. Obviously, however, any suitable mixture of gases may be used. For purposes of illustration, such mixtures as neon and mercury vapor or argon and mercury vapor have been found to be very successful.

We have described and shown as the means for sterilizing a source of irradiation of ultra-violet light. The invention in its broad aspects, however, is not limited to this specific source of sterilization as other known sterilization sources whether of irradiating character or of some other character may well be used.

We have found that to obtain the highest concentration of radiations upon the upper portion of the glass, there is a definite relation between the position of the area to be irradiated and the angle of the reflector 30. That is, with the source of light, a constant distance  $a$  above an element of area  $s$  on the vertical wall of the glass, the position of the source of light to give the maximum radiation may be calculated in the following fashion: With  $a$  as the vertical distance of the source of light from the area to be sterilized and  $r$  as the horizontal distance of the source of light from the area to be irradiated, then the radiant energy  $E$  falling on the unit area normal to the radiation at a distance equal to the square root of  $(a)^2$  plus  $(r)^2$  is  $K$  divided by the sum of  $(a)^2$  and  $(r)^2$  where  $K$  is the radiant energy falling on unit area at unit distance from the source. The projection of the area  $s$  normal to the radiation is equal to the area  $s$  times the cosine of the angle between a horizontal line and radiations directly from the source of light to the area. Therefore, the total energy  $I$  falling on a given surface  $s$  is

$$I = sK[r(a^2 + r^2)^{-3/2}]$$

The distance  $r$ , such that area  $s$  will receive maximum radiation, can be found by use of calculus from the equation just given, and this value for  $r$  is equal to  $a$  divided by the square root of 2 for any given vertical distance  $a$ . We may also calculate from this that  $a$  divided by  $r$  is equal to the square root of 2 which is equal to the tangent of the angle between the horizontal line and the

direction of radiation from the source to the area  $s$ . This angle, therefore, is equal to 54 degrees, 44 minutes, which should be the angle which the converging portion 30 of the reflector surface makes with the horizontal.

Reflecting surface 30 preferably is extended inwardly a sufficient distance to protect the hand of the operator at the bottom of the glass from direct radiation from the portion 27 of the tube 14. Naturally, the glass itself will intercept the direct radiation from the inner portions 33 and 34, so there is little or no danger of an attendant being subjected to an excessive amount of radiation from this device.

Referring now to Fig. 6, we show in this figure the wiring diagram for connecting the tube 14 to the transformers 18 and 19 for energizing the tube. In this instance, the primaries 40 and 41 of the transformers are connected in parallel across a suitable source of current 42 which may be the usual 110 volt lighting circuit. The secondaries 43 and 44 of the transformers are each connected in series with the tube 14, one being connected to one end, and the other to the other end of the tube, the free end of the secondaries being grounded on the frame. Of course, where only one transformer is used, then it is only necessary to remove the connections for one of the transformers and thus connect the tube across the secondary of the other transformer. The switch 45 located in the primary side of the circuit may be a manually operated switch of any usual type. However, I prefer to have this switch operated either in the fashion shown in Fig. 1 or as shown in Fig. 7. In Fig. 1, the switch operating lever 46 is mounted directly on the draft arm in position to be engaged by the drinking vessel placed beneath the nozzle 13 so that pressure against the lever results in closing the circuit to energize the tube 14. In Fig. 7, the switch 45' is shown as mounted on the valve in the path of the operating lever 12 so that the operator when he closes the valve will close the switch and thus energize the sterilizing device.

From the above description, it is believed that the construction and operation of this device will be clear to those skilled in this art and the advantages thereof readily apparent.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. The combination of a dispensing device having a nozzle and a germ destroying sterilizing device operable to sterilize a glass or similar vessel adjacent the nozzle.
2. The combination with a dispensing device having a discharge nozzle and a sterilizer mounted around said nozzle, said sterilizer having means for directing a germ destroying sterilizing medium against a vessel placed in position to receive liquid from said nozzle.
3. The combination of a dispensing device having a nozzle for directing material into a receptacle held adjacent thereto with a source of irradiation surrounding said nozzle for directing radiations against the receptacle.
4. In a beverage dispensing device, the combination with a draft arm of a sterilizing device carried thereby and having means to direct a germ destroying sterilizing medium upon a receptacle receiving material from the draft arm.
5. In a beverage dispensing device, the combination with a draft arm of a sterilizing device carried thereby and having means to direct a

sterilizing medium upon a receptacle to be filled from the draft arm, said draft arm having a detachable nozzle, and said sterilizing device having a supporting frame held in position by the nozzle.

6. In a beverage dispensing device, the combination with a draft arm of a sterilizing device carried thereby and having means to direct a sterilizing medium downwardly upon a receptacle to be filled from the draft arm, said sterilizing device comprising a source of radiant energy surrounding the outlet of the draft arm.

7. The combination of a dispensing device having a discharge nozzle with a source of ultraviolet radiation mounted on said device around said nozzle together with means for directing the radiations therefrom downwardly around the discharge end of the nozzle.

8. The combination of a dispensing device having a discharge nozzle with a source of ultraviolet radiation mounted on said device around said nozzle together with means for directing the radiations therefrom downwardly around the discharge end of the nozzle, said nozzle having means thereon to prevent pushing a drinking vessel up against the source of radiation.

9. The combination of a dispensing device having a discharge nozzle with a source of ultraviolet radiation mounted on said device around said nozzle together with means for directing the radiations therefrom downwardly around the discharge end of the nozzle, said nozzle detachably holding the source of radiation in place.

10. The combination with a draft arm of a dispensing device, of a source of sterilizing radiation, said draft arm having a nozzle, and said source of radiation encircling said nozzle, a frame carried on the draft arm, and a transformer carried by said frame for supplying high potentials to said source of radiations.

11. The combination with a dispensing device having a discharge nozzle of a gaseous conduction tube encircling said nozzle, and a reflector around said tube for directing the radiations therefrom in the direction of discharge of said nozzle.

12. The combination with a dispensing device having a discharge nozzle of a gaseous conduction tube encircling said nozzle, a reflector around said tube for directing the radiations therefrom in the direction of discharge of said nozzle, a switch controlling the supply of current to said tube, and a lever operable by the insertion of a glass beneath said nozzle to close said switch.

13. The combination with a dispensing device having a discharge nozzle of a gaseous conduction tube encircling said nozzle, a reflector around said tube for directing the radiations therefrom in the direction of discharge of said nozzle, a switch controlling the supply of current to said tube, and a lever operable by the insertion of a glass beneath said nozzle to close said switch, said reflector having a downwardly converging lower portion extending inwardly beneath the tube.

14. The combination with a dispensing device having a discharge nozzle of a gaseous conduction tube encircling said nozzle, a reflector around said tube for directing the radiations therefrom

in the direction of discharge of said nozzle, said tube comprising an outer annular portion and an inner annular portion, said last named portion being slightly above the outer portion and closely encircling the nozzle.

15. The combination with a dispensing device having a discharge nozzle of a gaseous conduction tube encircling said nozzle, a reflector around said tube for directing the radiations therefrom in the direction of discharge of said nozzle, said tube comprising an outer annular portion and an inner annular portion, said last named portion being slightly above the outer portion and closely encircling the nozzle, said reflector having a downwardly converging portion directly beneath the outer portion of said tube.

16. The combination of a dispensing device having a nozzle and a sterilizing device operable to sterilize a glass or similar vessel positioned adjacent the nozzle, and means operable by the positioning of the glass to actuate said sterilizing device.

17. The combination of a dispensing device having a nozzle and a sterilizing device operable to sterilize a glass or similar vessel positioned adjacent the nozzle, said dispensing device having a control valve and means operable by movement of said control valve toward open position to actuate said sterilizing device.

18. The combination of a dispensing device having a nozzle and a sterilizing device operable to sterilize a glass or similar vessel positioned adjacent the nozzle, and a lever operable by the positioning of a vessel beneath said nozzle to actuate the sterilizing device.

19. The combination of a dispensing device having a nozzle for directing fluids into a receptacle held adjacent thereto, and a valve controlling flow of fluid therefrom, with a source of irradiation surrounding said nozzle for directing radiations against the receptacle, and means for energizing and deenergizing said source of irradiations in response to movements of said valve.

20. The combination of a dispensing device having a discharge nozzle with a source of radiation, and means for directing radiations from said source against a vessel in position to receive liquid from said nozzle.

21. The combination with a dispensing device having a dispensing nozzle, of an electrical device producing germ destroying energy and directing said energy on a receptacle beneath said nozzle.

22. The combination of a dispensing device having a nozzle for directing material into a receptacle placed adjacent to the nozzle with a device capable of passing a germ destroying radiation through the atmosphere about said receptacle.

23. The combination of a dispensing device having a nozzle for directing material into a receptacle placed adjacent to the nozzle, with an electrically energized device capable of passing a germ destroying radiation through the atmosphere at the outlet of said nozzle.

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