

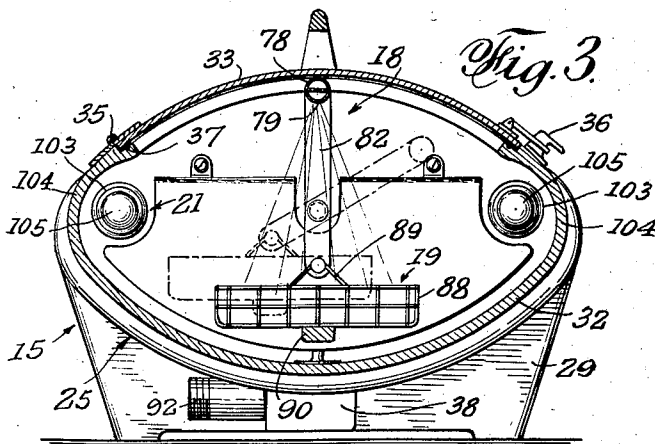
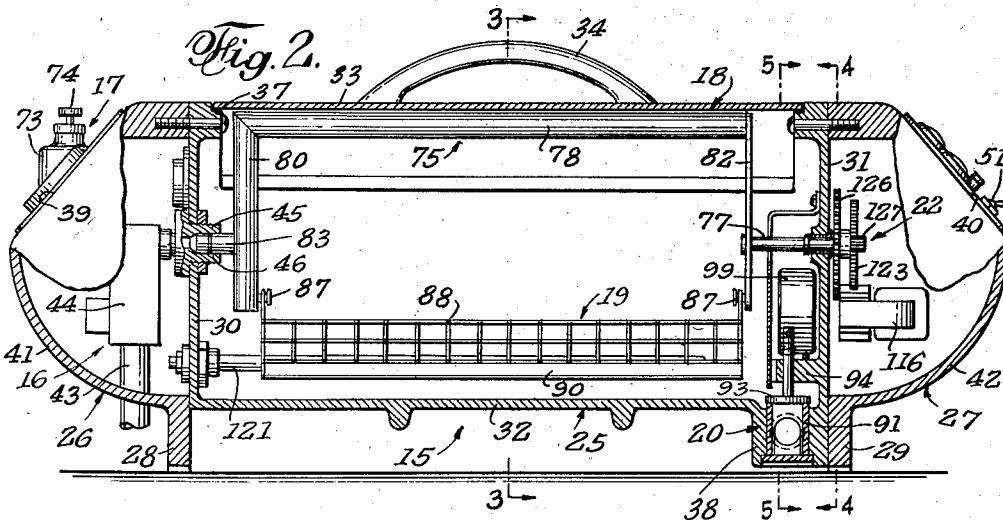
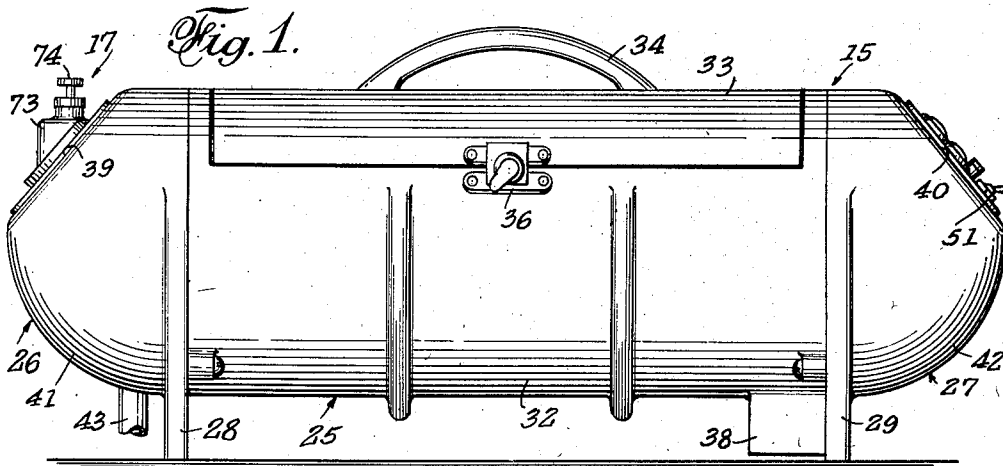
June 9, 1959

F. H. BRAUN ET AL
WASHER AND STERILIZER

2,889,837

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4 Sheets-Sheet 1



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Fig. 4.

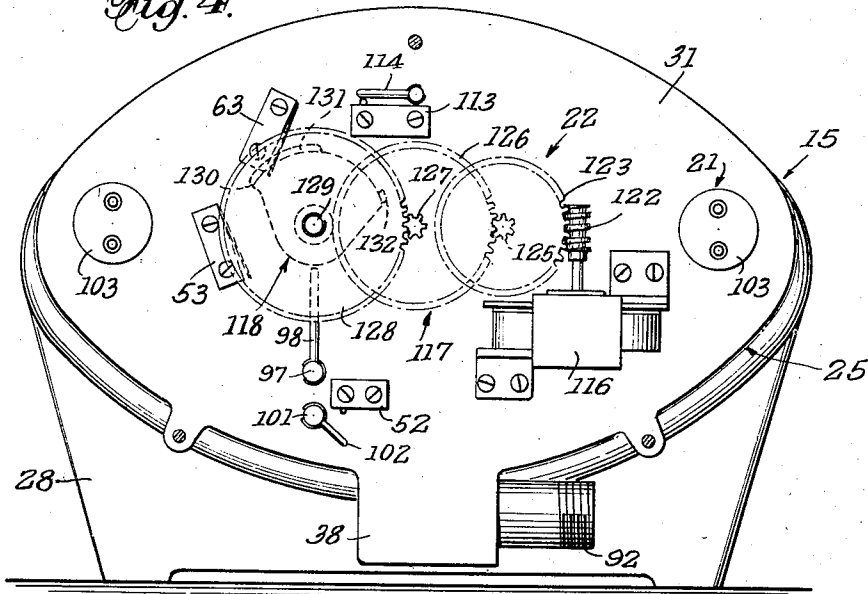
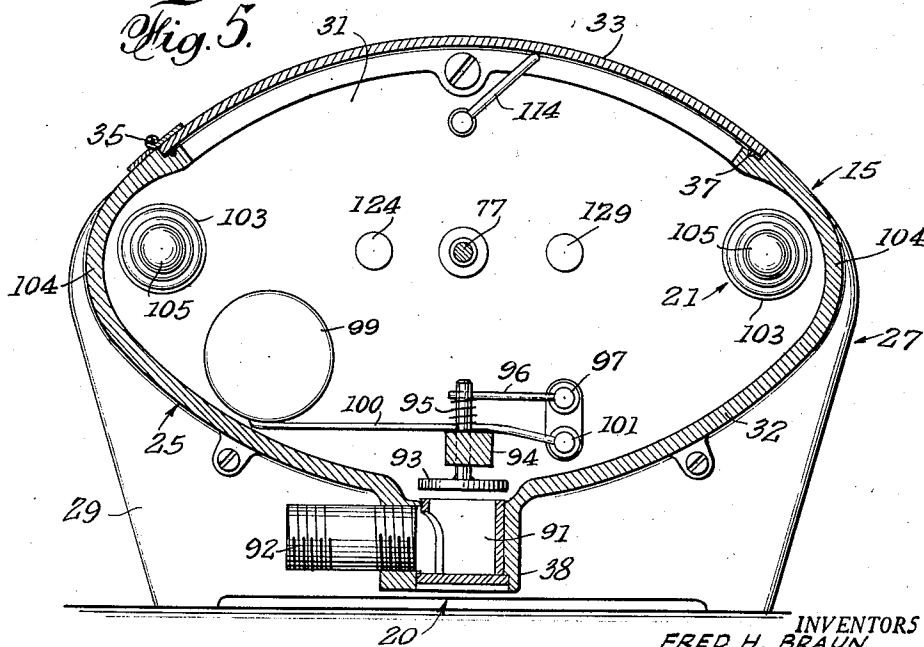


Fig. 5.



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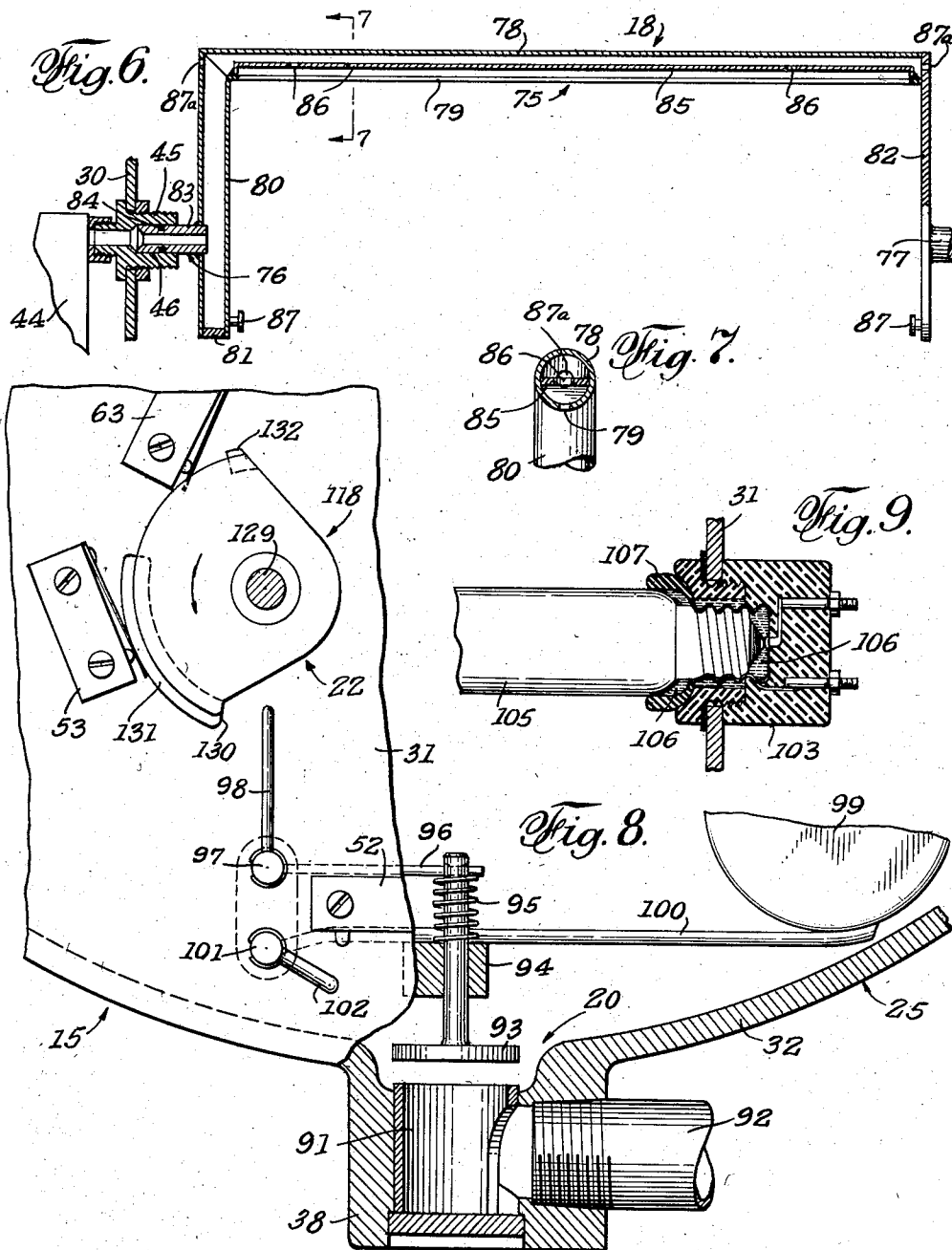
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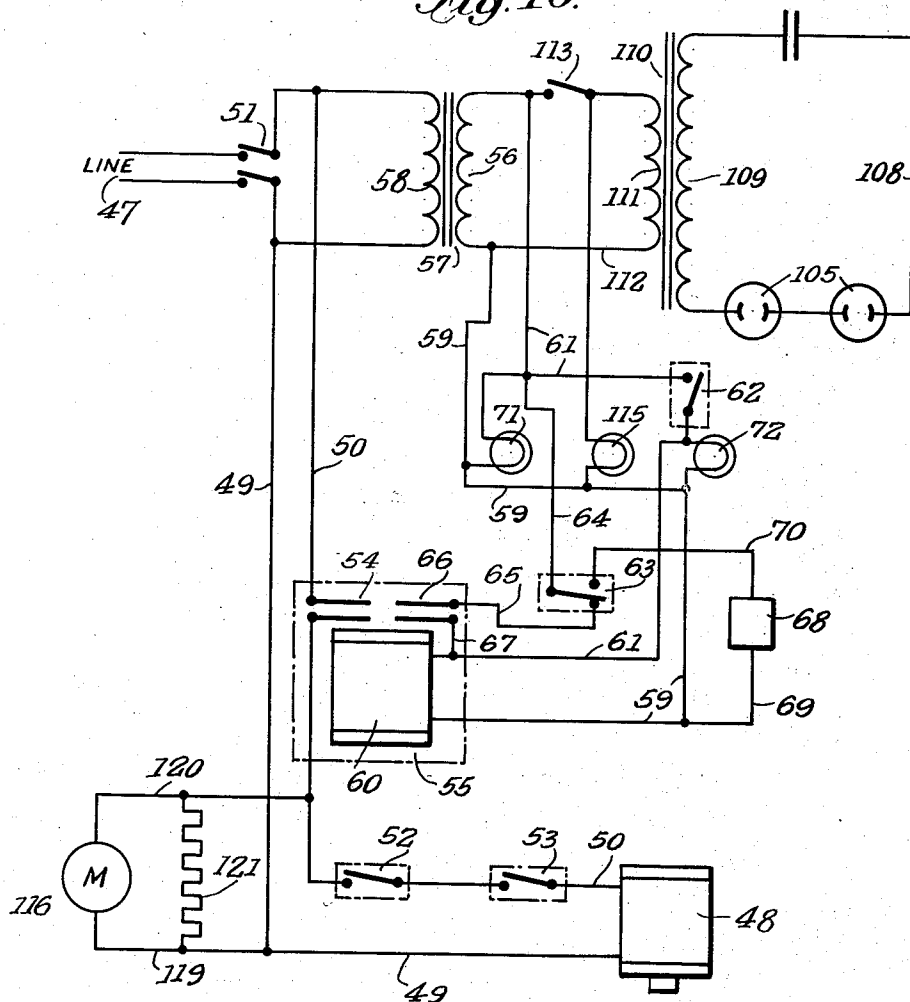
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Fig. 10.



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WASHER AND STERILIZER

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Application October 17, 1955, Serial No. 540,695

11 Claims. (Cl. 134—140)

This invention relates to a washer and sterilizer for general use and particularly adapted to wash and sterilize the instruments of physicians, surgeons and dentists.

Heretofore, when absolute sterility of instruments was desired, steam and pressure were the usual mediums employed. It is an object of the present invention to wash, sterilize, rinse and dry instruments of the character indicated without using pressure and/or steam, thereby obviating the dangers attending such use.

Another object of the invention is to provide a device that automatically carries out an operation in which the successive steps of washing, sterilizing, rinsing and drying are carried out in a cyclic operation that does not require attention.

A further object of the invention is to provide sterilizing means in which ultra-violet rays are used and which generate bacteria-destroying gases in such degree that effective sterilization is obtained.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a side elevational view of a washer and sterilizer according to the present invention.

Fig. 2 is a longitudinal sectional view thereof.

Fig. 3 is a cross-sectional view as taken on the line 3—3 of Fig. 2.

Figs. 4 and 5 are enlarged cross-sectional views as taken on the respective lines 4—4 and 5—5 of Fig. 2.

Fig. 6 is a similarly enlarged fragmentary and longitudinal sectional view of spray means used in the construction.

Fig. 7 is a further enlarged cross-sectional view as taken on line 7—7 of Fig. 6.

Fig. 8 is a similarly enlarged fragmentary view, partly in cross-section, of elements of the construction that are shown in Figs. 4 and 5.

Fig. 9 is a broken longitudinal sectional view of an ultra-violet ray tube and socket as used in the device.

Fig. 10 is a wiring diagram.

The washing and sterilizing device that is illustrated comprises, generally, a housing 15, an inlet 16 for washing fluid, means 17 for introducing a detergent into the fluid, fluid-spraying means 18, instrument-carrying means 19, drain means 20, ultra-violet lamp means 21, and

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operating and cyclic timing means 22 to control the inlet 16 and the means 18 and 20.

The housing 15 is here shown as comprising a tank 25 and ends 26 and 27 affixed to the opposite ends of said tank, said ends being provided with support walls 28 and 29, respectively. The tank is preferably formed to have end walls 30 and 31 that are connected by an oval wall 32 that is open at the top, said opening being provided with a cover or lid 33 having a handle 34. The cover is carried on a hinge 35 and a latch or lock 36 is provided for holding the cover closed and in sealing engagement with a gasket 37 carried by the tank. A lower boss 38 is formed in the tank wall 32 and the same houses the drain 20.

The housing ends 26 and 27 are similarly shaped and are preferably formed to have sloping upwardly facing walls 39 and 40, respectively, and lower curved closure walls 41 and 42, respectively.

It will be clear that the tank end walls 30 and 31 contain fluid in the tank and prevent the same entering the housing ends 26 and 27.

The inlet 16 is shown as a pipe 43 that extends through wall 41 of housing end 26, a solenoid valve 44 to which said pipe 43 is connected, and a fitting 45 affixed to tank wall 30 and which is provided with a bearing socket 46. Said valve 44 controls flow between pipe 43 and socket 46.

As shown in the wiring diagram of Fig. 10, a current source 47 is connected to energize the coil 48 of valve 44 by means of conductors 49 and 50. The circuit thus provided includes a master switch 51, a float-controlled switch 52 and a switch 53, all of which must be closed to effect energization of coil 48 and opening of valve 44. Said circuit is also controlled by a switch 54 provided in a relay 55.

The energy for relay 55 is provided by the secondary low-voltage coil 56 of a transformer 57 whose primary coil 58 is connected across the current source 47. The circuit that provides said energy comprises conductor 59 from one side of secondary 56 to the coil 60 of the relay, a conductor 61 from the said coil to the opposite side of the secondary 56, and a push button switch 62 in the latter conductor.

Relay 55 is of the holding type, a switch 63 being provided to hold the coil 60 energized after release of push button switch 62. To this end, a conductor 64 connects switch 62 and conductor 61, a conductor 65 from said switch connects to a relay-controlled switch 66 which is connected to the coil 60 by a conductor 67. Thus, when switch 62 is open and switch 63 closed, the relay coil 60 remains in energizing circuit and this circuit is maintained until switch 63 is opened.

When switch 63 is opened to open the circuit to the relay 55, an audible signal may be sounded, the buzzer 68 (Fig. 10) being provided for this purpose. By connecting one side of said buzzer by a conductor 69 to conductor 59 and the other side by a conductor 70 to the open side of switch 63, said buzzer is placed in circuit with the secondary coil 56 when the switch 63 is actuated to move from relay-energizing position.

A tell-tale light 71 is placed across secondary 56 to apprise of closing of switch 51 and that electrical power is being conducted to the device. A tell-tale light 72 is shown connected in the relay-energizing circuit, the same being lit when switch 63 is in the position shown and the relay coil energized. This light, being connected across the coil 60, remains lit only as long as said coil is energized and darkens when the buzzer 68 sounds.

The means 17 is shown as a container 73 that may be

removably carried by housing end 26 and is provided with atomizing or spraying means 74 that may be actuated to dispense the contents of said container into tank 25 in desired quantities. Liquid detergent is contemplated as the liquid in container 73.

The spraying means 18 is best seen in Figs. 2, 3, 6 and 7 and comprises, generally, a U-shaped frame 75, and aligned trunnions 76 and 77 mounting said frame for rotation within the interior of tank 25.

The frame 75 is shown as comprised of a horizontal tube 78 that has a longitudinal slit 79 provided in the inner or lower portion thereof, a transverse tube 80 connected to one end of tube 78 and having a closed end 81, and a transverse bar 82 connected to the other end of tube 78.

Trunnion 76 comprises a nipple 83 that extends into the interior of tube 80 and has journal bearing in the socket 46 of fitting 45, an O-ring 84 serving to seal between said nipple and socket to enable rotating of the former. Trunnion 77 comprises a driven shaft of the means 22 later described.

It will be understood that the fluid released by valve 44, when open, passes into tube 80 and thence into tube 78 to pass outward through slit 79 in the form of a spray, as indicated in Fig. 3. For the purpose of uniformly distributing the fluid in tube 78, a bridge piece 85 is placed longitudinally therein to form a baffle wall which has perforations 86 that are placed to provide the mentioned uniformity of fluid dissemination. Also, the tube 80 and the end of bar 82 opposite tube 78, are provided with perforations 87-a to direct fluid against tank walls 30 and 31 to clean them during operation of the device.

While tube 78 is disposed on one side of the axis of rotation of the frame 75, the ends of tube 80 and bar 82 have oppositely directed ends disposed on the opposite side of said axis. As can be seen from Fig. 6, said ends are provided with studs 87 on which the instrument-carrying means 19 is carried.

Said means 19 is shown as an open basket or tray 88, provided with end suspenders 89 engaged with studs 87, and provided with a weight 90 that holds said tray horizontally pendent during rotational movement of frame 75. Fig. 3 shows two positions of the means 18 and it will be apparent that the spray from slit 79 not only impinges on the top of the instruments in tray 88 but also impinges on the sides and under faces of said instruments during the course of a cycle of rotation of the frame 75.

The drain means 20 comprises an outlet 91 in boss 38 connecting with an outlet nipple 92, and a disc valve 93 controlling said outlet 91 and guided for vertical movement in a projection 94 formed in tank wall 31.

Said means 20 further includes an expansion spring 95 around the stem of valve 93 and which abuts, at one end, on projection 94 and, at the other end, against the free end of a rod 96 which connects with valve 93. Said rod is carried by a stud 97 rotationally carried by tank wall 31. It will be seen that the spring 95 normally expands to raise valve disc 93 in spaced relation to the end of outlet 91. This is the draining position of the means 20. See Figs. 5 and 8.

The mentioned valve is disposed on the tank side of wall 31, the stud 97 extending through said wall and being provided on the other side with a rod 98 that is adapted to be actuated by the cyclic timing means to overcome spring 95 and cause rod 96 to move the valve to drain-closing position.

A float means is associated with the drain means, the same comprising a float 99 carried on the end of an arm 100 which is connected to a stud 101 having rotational bearing in wall 31. Said float means is responsive to fluid in tank 25 and the stud 101 carries an actuator rod 102 that operates switch 52 when the level in said tank raises float 99 to a predetermined height. Switch 52 is a normally-closed switch and the float opens the same to open the circuit that energizes solenoid coil 48 of valve 44.

The ultra-violet lamp means 21 comprises two lamp sockets 103 carried by tank wall 31 and positioned at the foci of generation of the curved wall sides 104 of tank 25. While the position of the sockets is approximate to the foci, the lamps 105 mounted therein, in addition to direct rays into the tank, use said curved sides 104 to send reflected rays into the tank. For this purpose, the inner faces of the curved wall sides are polished for high reflection.

The sockets 103 are generally conventional and the electrical contacts thereof are rendered proof against the fluid in the tank by filling the same with a dielectric grease 106 that serves to exclude the fluid. A soft rubber ring 107 around the base of each tube serves to retain the grease and serves as a seal, as shown in Fig. 9.

It will be seen that the lamps 105 are impinged by spray from means 18 as the latter rotates on the axis of trunnions 76 and 77. The particles of fluid that contact said lamp, being divided, become charged with ozone—a gas that greatly lends to sterilization of the fluid.

Said lamp sockets 103 are connected in a series circuit 108 with the secondary winding 109 of a step-up transformer 110. The primary winding 111 of said transformer is connected across the secondary 56 of transformer 57, the connecting circuit 112 including a switch 113 that is actuated by means 114 controlled by the cover or lid 33 of tank 25. Thus, the lamps 105 can be on only when said tank lid is closed. A tell-tale light 115 is connected across circuit 112 and apprises of the condition of the lamp circuit, the lamp lighting only when switch 113 is closed.

The cyclic timing means 22 is best shown in Figs. 2 and 4 and comprises, generally, an electric motor 116, a gear train 117 driven by said motor, and a cam 118 driven by said train, the spray means 18 also being driven by said train of gears.

The motor 116 is mounted on wall 31 of the tank 25 and is connected to the current source 47 by conductors 119 and 120 which are connected across the conductors 49 and 50. Only the power switch 51 and the relay switch 54 control the motor circuit. A heater 121, located in tank 25 to heat the fluid therein, is shown in the diagram as connected across the motor circuit and is in circuit when switches 51 and 54 are closed.

Motor 116 is provided with a worm 122 on its output shaft, the same driving a worm wheel 123 mounted on wall 31 to turn on a center 124. A pinion gear 125, driven by the worm wheel, drives a gear 126 on the trunnion 77. This is the drive for the spray means 18.

A pinion gear 127 on the axis of trunnion 77 rotates with gear 126 and drives a gear 128 on a center 129, the mentioned cam 118 being connected to rotate with gear 128. Thus, the cam 118 rotates at a slower rate than does trunnion 77 which makes several revolutions for each full rotation of the cam. The latter is provided with a shoulder 130 that moves in the path of rod 98 to deflect the latter and cause closing of the drain valve 93, a shoe 131 that operates switch 53 in the fluid-control circuit 49, 50, and a shoe 132 that operates switch 63 to establish the relay circuit above described.

Since the motor circuit is opened by relay switch 54, when shoe 132 operates switch 63 to open the relay circuit, said motor stops and the means 22 stops moving with said shoe 132 holding the buzzer circuit closed. The latter remains on until power switch 51 is opened. Only when the latter switch is closed and switch 62 manually operated is the cycle of operation repeated.

Operation

After tray 88 is filled with articles to be sterilized and the lid 33 is closed and latched, the power switch 51 is snapped on and the button of switch 62 is pushed to close said switch. This will establish the circuit through the relay coil 60 which becomes energized and closes switches 54 and 66. Now, the motor circuit is estab-

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lished to move shoe 132 away from switch 63 which moves to the position of Fig. 10 to hold the relay circuit. Since the float 99 is down, switch 52 is closed, being normally closed. At this point, cam shoe 131 is holding switch 53 closed. Since the circuit to the solenoid valve coil 48 is now closed, the spray of liquid from means 18 washes over the instruments and out through the open drain.

The motor circuit being closed at the same time, the cam rotates until shoulder 130 engages rod 98 to close the drain and the same remains closed as tank 25 fills to a predetermined level under control of float 99 and switch 52 opened thereby. The valve 44 closing, the spray shuts off. The means 18 continues to rotate intermittently dipping the instrument-laden tray into the water which is agitated by tube 75 as the same moves therethrough. At this time, the means 17 may be operated to introduce detergent into the bath.

The ultra-violet ray lamps act on the instruments in the tray as the same move into and out of the bath, which is being heated to about 170° to 180° F.

When rod 98 is released, the drain opens to dump the contents of the tank. Thereafter, the spray means may again be turned on to rinse the instruments, tank walls and lamps 105 and this rinse stopped to allow the heat of heater 121 to dry the instruments.

The particular steps of the cycle of operation may be varied and the time allotted to each step also varied without change in the concept of the present invention.

While the foregoing has illustrated and described what is now contemplated to be the best mode of carrying out our invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

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

1. A washer and sterilizer comprising an enclosed housing, said housing including a tank, spray means disposed in the tank, means to rotate the spray means located in the housing outside the tank, an article-holding tray suspended from the spray means and movable therewith in a rotary path, a drain in said tank, means to control the drain to discharge or retain the spray fluid, as desired, and ultra-violet lamp means within the tank and providing rays that impinge on the articles in said tray during the mentioned movement of the tray, said spray means including a discharge that impinges on the ultra-violet lamp means as said means rotates.

2. A washer and sterilizer comprising an enclosed housing, said housing including a tank, spray means disposed in the tank, means to rotate the spray means located in the housing outside the tank, an article-holding open mesh tray suspended from the spray means and movable therewith in a rotary path, said spray means being formed to direct its spray to impinge on articles disposed in the tray during all rotated positions of both the spray means and the tray, a drain in said tank, means to control the drain to discharge or retain the spray fluid, as desired, timing means operatively connected to both the spray means and the drain means to close the drain during filling of the tank by the spray means, ultra-violet lamp means within the tank and providing rays that impinge on the articles in said tray during the mentioned movement of the tray, said spray means including a discharge that impinges on the ultraviolet lamp means as said means rotates.

3. A washer and sterilizer according to claim 2, said lamp means embodying lamp sockets, and said sockets being filled with dielectric grease to insulate the same against the fluid spray.

4. A washer and sterilizer comprising an enclosed housing, said housing including a tank, spray means dis-

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posed in the tank, said tank being elliptical in cross-sectional form, and ultra-violet lamp means disposed approximately at the foci of the curved ends of the tank, said latter means being adapted to be impinged by the spray of the spray means.

5. In a washer and sterilizer, a spray device comprising a rotating elongated member having a longitudinal slit to emit spray, an article-holding tray suspended from the device and movable bodily in a circular path as the member rotates, the slit being directed to direct spray fluid onto the articles on the tray as the device is rotated around the tray, a tank in which the spray means is disposed and having an elliptical cross-sectional form, and ultra-violet ray means within the tank outside of the paths of movement of the slitted member and article-holding tray.

6. In a washer and sterilizer, a spray device comprising a rotating elongated member having a longitudinal slit to emit spray, an article-holding tray suspended from the device and movable bodily in a circular path as the member rotates, the slit being directed to direct spray fluid onto the articles on the tray, a tank in which the spray means is disposed and having an elliptical cross-sectional form, and ultra-violet ray means within the tank outside of the paths of movement of the slitted member and article-holding tray, said latter means comprising two ultra-violet lamps and sockets mounting said lamps, said sockets being disposed at the approximate foci of the end curves of the elliptical tank.

7. A washer and sterilizer comprising an enclosed housing, said housing including a tank, spray means disposed in the tank, means to rotate the spray means located in the housing outside the tank, an article-holding tray suspended from the spray means and movable therewith in a rotary path, a drain in said tank, means to control the drain to close the same after a predetermined drain-open period, and a float-controlled means to open the drain when the fluid in the tank reaches a predetermined level, an electric motor, a gear train driven by said motor, a drive between said train and the spray means to rotate the latter, and a slower drive between said train and the drain-controlling means.

8. In a washer and sterilizer, a rotatable bar, a rotatable tube having one end open, said tube and said bar being of the same length and rotatable in a vertical plane, a spray tube mounted in between the bar and the first tube (and at the open end of the latter), and an article holding tray freely suspended in between the bar and the first tube at the ends thereof opposite from said spray tube, said tray being adapted to maintain a horizontal position while rotated by the bar and the first tube.

9. In a washer and sterilizer according to claim 8: the spray tube having a longitudinal slit therein for directing the spray toward the tray, and the tray having a perforated bottom to permit the spray to penetrate the same and impinge on the articles therein as the spray tube is rotated around the tray.

10. In a washer and sterilizer according to claim 8: the spray tube having a longitudinal slit therein for directing the spray toward the tray, and a longitudinal bridge piece within the tube directly above the slit, said bridge piece having a plurality of perforations therein.

11. A washer and sterilizer comprising an enclosed housing, said housing including a tank, spray means disposed in said tank, means to rotate the spray means located in the housing outside the tank, an article-holding open mesh tray suspended from the spray means and movable therewith in a rotary path, said spray means being formed to direct its spray to impinge on articles disposed in the tray during all rotated positions of both the spray means and the tray, a drain in said tank, means to control the drain to discharge or retain the fluid spray, as desired, said spray means being provided with a spray head that is offset from the axis of rotation of the spray means, the spray means being provided with extensions

on the opposite side of said axis from the spray head,
and said extensions being provided with means by which
the tray is suspended.

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