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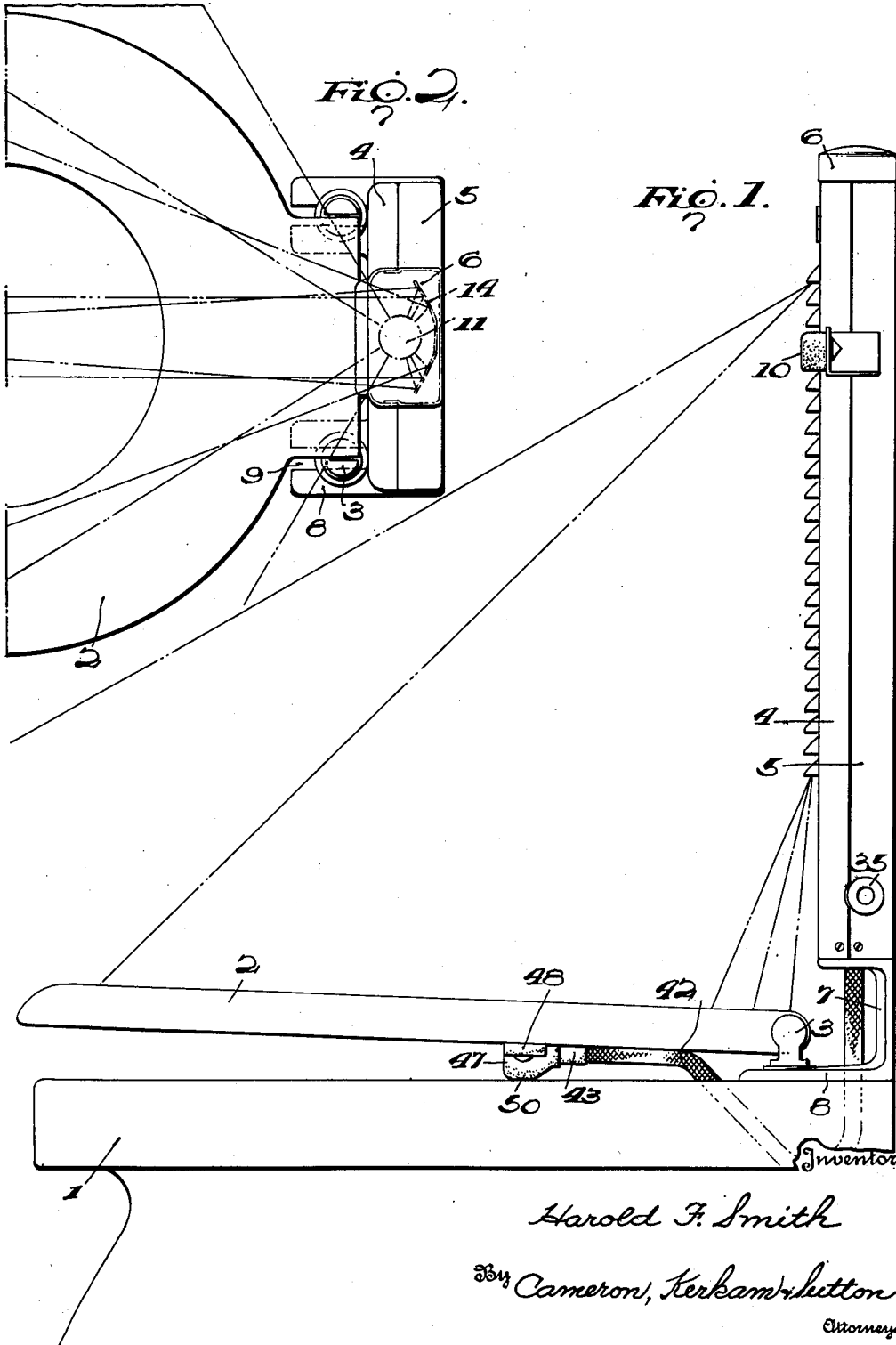
H. F. SMITH

2,616,097

TOILET SEAT SANITIZER

Filed Aug. 28, 1947

3 Sheets-Sheet 1



Nov. 4, 1952

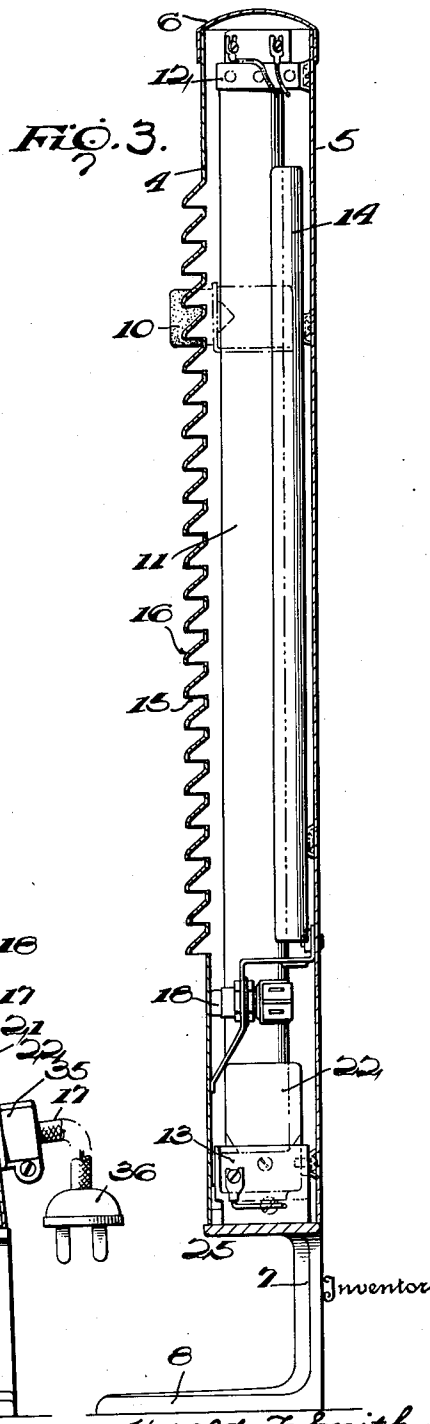
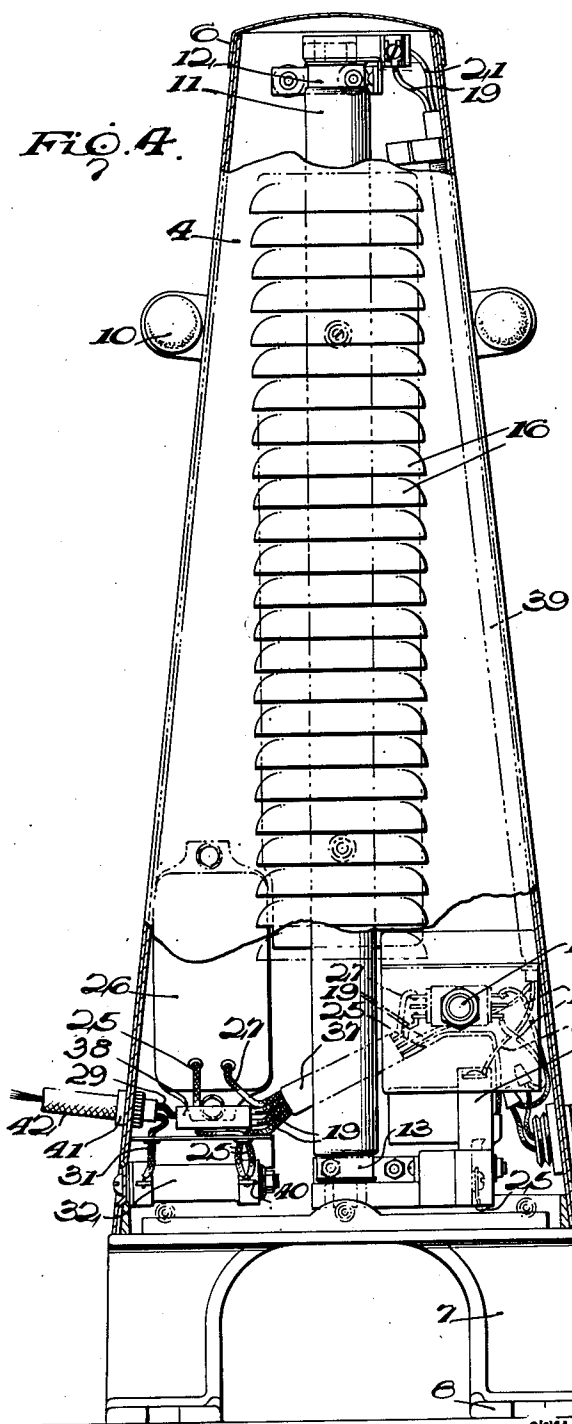
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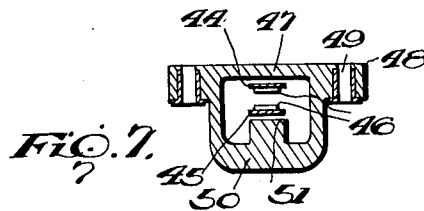
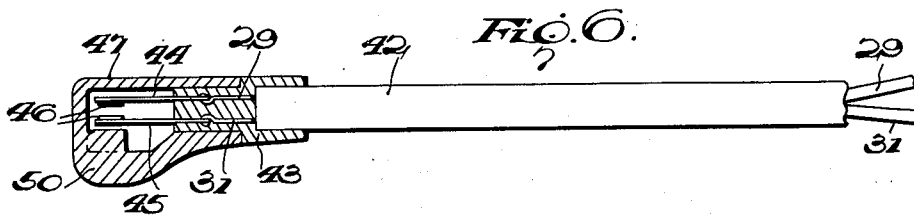
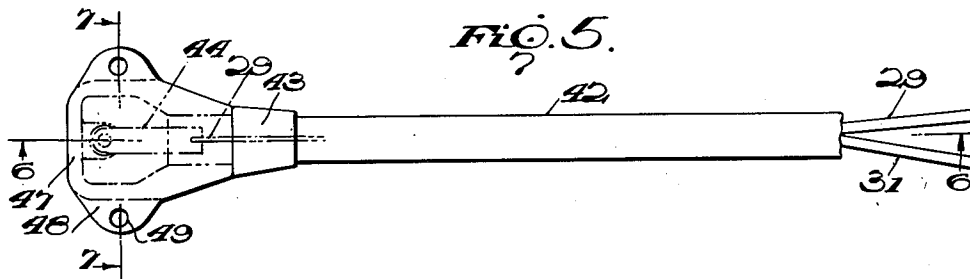
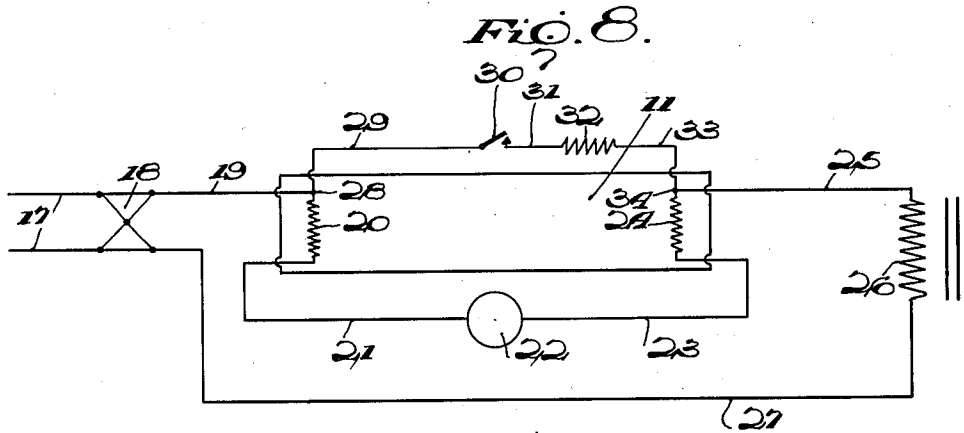
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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TOILET SEAT SANITIZER

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11 Claims. (Cl. 4—233)

1

This invention relates to the sanitization of toilet seats by ultraviolet light.

Various types of apparatus have been devised heretofore for the above purpose. In general, it is desirable to confine the ultraviolet radiation fairly closely to the area of the seat, and also to interrupt the radiation when the toilet is in use so as to avoid exposure of the person thereto. It has been proposed to accomplish these ends by elevating the seat into a sanitizing cabinet or the like when not in use, or conversely by lowering the sanitizing apparatus down over the seat, suitable switching mechanism being provided whereby the lamp is energized only at these times. However, such apparatus is undesirably complicated due to the need for spring-actuated mechanism or the like for automatically moving the seat or cabinet and for associated automatically actuated switching mechanism, and hence is expensive and frequently out of order, etc.

One of the objects of the present invention is to accomplish the above ends automatically by simple and inexpensive yet effective, reliable and durable means.

Another object is to provide an apparatus as characterized in the foregoing object which can readily be attached to existing facilities without modification or replacement thereof.

A further object is to eliminate the need for seat or cabinet actuating mechanisms characteristic of prior apparatus of the type discussed above.

A still further object is to eliminate the need for on-and-off switching mechanism of the type heretofore employed while retaining, however, the desirable feature of interrupting the radiation of ultraviolet energy when the toilet is in use.

Another object is to provide sanitizing apparatus in the form of a complete self-contained unit to be manufactured and sold as a complete unit ready for use with existing toilet facilities.

Briefly described, the invention comprises an ultraviolet lamp in a stationary casing having an upright position at the rear of the seat, the casing being suitably mounted on the wall or tank or preferably connected detachably to the usual bolts or studs on the bowl which provide a pivot for the seat. The casing is designed and constructed to direct and confine the radiation fairly closely to the plan area of the seat and bowl, the seat remaining lowered on the bowl. The lamp is controlled by a compressible switch element arranged so that radiation from the

2

lamp is interrupted by compression of the switch element by the seat due to the added weight thereon when in use.

One embodiment of the invention has been illustrated in the accompanying drawings, but it is to be expressly understood that said drawings are for purposes of illustration only and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings

Fig. 1 is a side view of sanitizing apparatus embodying the invention;

Fig. 2 is a partial plan view of Fig. 1;

Fig. 3 is a vertical section through the casing of the sanitizing apparatus;

Fig. 4 is a front view of the casing, portions of the front wall being broken away to show the interior parts;

Fig. 5 is a view of the control switch;

Figs. 6 and 7 are sections on the lines 6—6 and 7—7 of Fig. 5; and

Fig. 8 is a wiring diagram.

As noted above, sanitizing apparatus embodying the invention constitutes a self-contained unit adapted for use with existing toilet facilities without replacement of parts or substantial modification thereof. Figs. 1 and 2 show such facilities of conventional form, including a toilet bowl 1 and seat 2. The seat may be of any known type, either a continuous ring or split ring, and is suitably pivoted on the bowl by means such as pivot brackets or studs 3 so that it may be lowered on the bowl as shown in Fig. 1 or swung upwardly to a vertical position in the usual manner.

The sanitizing unit is housed in a suitable casing which as shown comprises front and rear parts 4 and 5 and a cap 6. This housing or casing is mounted in an upright position at the rear of the seat 2 and is suitably attached to and supported on the toilet. Preferably and as shown the casing stands on a bracket 7 having forwardly extending feet 8 each of which is slotted at 9 to engage one of the pivot members 3. The casing may also carry bumper buttons 10 in position to be engaged by the seat 2 when elevated. Thus the casing may be quickly and easily installed and just as quickly and easily removed without modification of the bowl or seat and without interfering in any way with their normal operation and use. However, any other desired type of supporting means may be employed.

The casing 4, 5 houses a suitable source of

ultraviolet radiation, preferably a tubular mercury arc lamp 11 carried by upper and lower holders 12 and 13, respectively, which are attached to the rear casing part 5 and engage the upper and lower ends of the tube to hold it in a vertical position in the casing. A suitable curved reflector 14 is preferably attached to the casing part 5 behind the arc tube to reflect rearwardly emitted radiation back toward the front of the casing as shown in Fig. 2.

The front casing wall 4 is provided with suitable openings for the emission of the ultraviolet radiation, the size, location and/or arrangement of the openings being such as to irradiate at least all of the plan area of the bowl and seat but preferably confining the emitted radiation fairly closely to this area. In the form shown, said front wall is provided with a series of louvered openings 15 extending horizontally in front of the tube and reflector and of such length that the emitted radiation spreads laterally over the entire width of the seat and bowl as shown in Fig. 2. Also the louvers 16 extend along the upper edges of the openings 15 and are inclined forwardly and downwardly toward the bowl and seat to direct and restrict the emitted radiation correspondingly as shown in Fig. 1. Thus the entire upper surface of the seat is irradiated. Also the radiation passes through the opening in the seat into the bowl and part of it is reflected back against the under surface of the seat.

The electrical energizing circuit for the ultraviolet source may take any suitable form adapted to the type of light source use. In the case of a mercury arc tube, a typical circuit is shown diagrammatically in Fig. 8. Current is supplied by the leads 17 to a suitable main switch 18, from which a circuit leads through conductor 19, filament 20 at one end of the tube 11, conductor 21, a suitable starter shown diagrammatically at 22, conductor 23, filament 24 at the other end of the tube, conductor 25, choke ballast 26, and conductor 27 back to the switch 18.

Although the main switch 18 can be operated by hand to shut off the current to the lamp when the toilet is in use, it is desirable to interrupt the arc discharge automatically at such times and for this purpose an automatic switch of the type described in detail hereinafter is employed. It will be understood that such a switch can be electrically connected with the unit in various ways depending upon the type of light source employed, the details of the energizing circuit, etc. However, with an arc lamp of the type described and a circuit as shown in Fig. 8, this result can be accomplished very simply by a circuit shunting the filaments 20 and 24 and containing a normally open switch, the circuit being arranged so that closing the switch reduces the voltage across the filaments to a value such that the arc discharge is no longer maintained.

The preferred arrangement is shown in Fig. 8. The shunt circuit begins at one end 28 of the filament 20 and comprises a conductor 29 leading from the point 28 to a normally open switch 30, a conductor 31 leading from the other side of the switch to a resistor 32, and a conductor 33 leading from the resistor to the end 34 of the filament 24. The resistor 32 prevents short circuiting the lamp but is proportioned so that the voltage across the lamp filaments is insufficient to maintain the arc discharge when switch 30 is closed. As soon as the switch is opened, however, the normal circuit is restored and the arc starts again.

Fig. 3 shows one way of installing the circuits of Fig. 8 in the unit. The leads 17 pass from the switch 18 through a grommet 35 in the wall of the casing and terminate in a suitable plug 36 or the like for connecting the unit to a supply line. The main switch 18 is of the double pole, single throw type. The conductor 19 passes therefrom through a taped wiring assembly 37 into an insulator 38 within which connections are made corresponding to the point 28 of Fig. 8. The conductor 19 is doubled back out of the insulator 38, through the wiring assembly 37, and up through an insulating tube 39 to the top of the casing where it is connected to the lamp filament 20 (not shown in Fig. 3). The conductor 21 passes back down through the tube 39 to the starter unit 22. The conductor 23 and lamp filament 24 are not shown in Fig. 3, but the conductor 25 leads through the wiring assembly to the connection 40 corresponding to the point 34 of Fig. 8 and thence to the ballast 26 from which conductor 27 passes through the wiring assembly 37 to the switch 18.

The shunt circuit which controls the operation of the arc is connected to conductor 19 within the insulator 38 as stated above. Conductor 29 leads from this insulator through a grommet 41 in the casing wall and into a flexible cable 42 connected to the switch 30 (not shown in Fig. 3), and conductor 31 leads back to the resistor 32. The other end of the resistor is connected at 40 to the conductor 25 (conductor 33 is not shown).

The automatic switch controlling the ultraviolet light source may take different forms depending on the nature of the circuit in which it is used, but its automatic operation is obtained in response to the increased weight of the seat when in use which actuates the switch contacts in the desired manner. Thus the switch is arranged to be compressed under the increased weight of the seat at such times and is preferably interposed between the seat and the rim of the bowl, being clamped or otherwise suitably attached to one of these parts. Since the switch is connected to the sanitizing unit through the flexible cable 42, it may be located at any convenient point without interfering in any way with the normal operation or use of the toilet. To prevent wetting of the switch and conductors, they are preferably completely enclosed in moisture-imperious material such as rubber or the like.

Figs. 5-7 show by way of example a suitable switch construction adapted to operate in the same manner as the switch 30 in the circuit of Fig. 8. The conductors 29 and 31 are enclosed in the rubber-covered flexible cable 42 which terminates in a plug 43 molded around or otherwise sealed to the end of the cable. The conductors 29 and 31 extend from the end of the cable and are connected respectively to spring switch blades 44, 45 carrying cooperating switch contacts 46. The interconnected ends of the conductors 29, 31 and spring blades 44, 45 are molded in the plug 43 in positions such that the switch normally remains open.

The switch contacts are enclosed in a housing or casing 47 into which the plug 43 extends, the joint being suitably sealed as by cement. In the form shown, the switch is adapted to be attached to the underside of the seat and to this end is provided at its top with suitable ears 48 having holes 49 for attachment screws. The lower part of the casing is thus adapted to engage the rim of the bowl and forms a more or

5

less rounded contact button 50. Sufficient flexibility and resiliency are provided in the walls of the casing to hold the weight of the seat alone without distortion of the casing but to permit distortion under compression when the seat is in use, in which case a lug 51 inside the casing engages the spring blade 45 and flexes it to cause engagement of the contacts 46, thus closing the switch.

The normal position of the parts is shown in Fig. 1, in which the weight of the seat alone is insufficient to compress the switch casing and hence the arc is in operation. The seat occupies the normal lowered position, the switch casing resting on the rim of the bowl in the same manner as the rubber buttons usually provided on the seat. Also the seat can be raised or lowered at will without affecting the operation of the arc and without being affected by the presence of the sanitizing unit. When the seat is in use, however, the added weight on the seat compresses the switch casing and closes the switch, at once interrupting the arc discharge as explained above in connection with the switch 30 and Fig. 8. As soon as the added weight is removed from the seat, the switch casing returns to its normal shape and the switch opens, whereupon the arc starts again.

The sanitizing unit is thus completely self-contained, requiring only to be plugged in to any convenient supply outlet. It can be applied quickly and easily to or removed with equal facility from existing toilet facilities as may be desired without altering in any way their customary operation and use. No reconstruction, replacement of parts, or other substantial modification of such existing facilities is involved. Also the complete unit is simple and relatively inexpensive, comprises practically no moving parts and lasts indefinitely without getting out of order, and yet is completely automatic in its operation.

While only one embodiment of the invention has been described and illustrated in the drawings, it will be understood that the invention is susceptible of a variety of other embodiments and also that various changes may be made in the form, details of construction and arrangement of the parts particularly illustrated and described. Reference should therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In apparatus of the class described, the combination with a toilet seat and bowl of an ultraviolet arc lamp for irradiating the seat, a circuit for energizing said arc lamp, switch means compressible by the seat when the toilet is in use to close the switch, and a circuit including said switch in parallel with the arc whereby compression of said switch means interrupts the arc discharge.

2. In apparatus of the class described, the combination with a toilet seat and bowl of an ultraviolet arc lamp for irradiating the seat, a circuit for energizing said arc lamp, switch means compressible by the seat when in use, said switch means comprising a flexible casing and switch contacts therein closable by flexure of the casing under compression, and a circuit in parallel with the arc and including said contacts whereby compression of said casing interrupts the arc discharge.

3. In apparatus of the class described, the combination with a toilet seat and bowl of an ultraviolet arc lamp for irradiating the seat, a

6

circuit for energizing said arc lamp, a flexible switch casing interposed between the bowl and seat and compressible therebetween when the seat is in use, switch contacts sealed in said casing against wetting and closable by flexure of the casing under compression, and a circuit in parallel with the arc and including said contacts whereby compression of said casing interrupts the arc discharge.

4. In apparatus of the class described, the combination with a toilet seat and bowl of an ultraviolet arc lamp for irradiating the seat, a circuit for energizing said arc lamp, a flexible switch casing secured to the under side of the seat and interposed between it and the bowl when the seat is lowered, switch contacts enclosed in said casing and closable by flexure thereof under compression when the seat is in use, and a circuit in parallel with the arc and including said contacts whereby compression of said casing interrupts the arc discharge.

5. In apparatus of the class described, the combination with a toilet seat and bowl of a casing at the rear of the seat, an ultraviolet arc lamp in said casing, means for directing the radiation downwardly from the casing to irradiate the plan area of the seat and bowl, a circuit for energizing said arc lamp, a flexible switch casing interposed between the bowl and seat and compressible therebetween when the seat is in use, switch contacts sealed in said casing against wetting and closable by flexure of the casing under compression, and a circuit in parallel with the arc and including said contacts whereby compression of said casing interrupts the arc discharge.

6. In apparatus of the class described, the combination with a toilet seat and bowl of a casing at the rear of the seat, an ultraviolet arc lamp in said casing, means for directing the radiation downwardly from the casing to irradiate the plan area of the seat and bowl, a circuit for energizing said arc lamp, a flexible switch casing secured to the under side of the seat and interposed between it and the bowl when the seat is lowered, switch contacts enclosed in said casing and closable by flexure thereof under compression when the seat is in use, and a circuit in parallel with the arc and including said contacts whereby compression of said casing interrupts the arc discharge.

7. A unit of the type described that is adapted for use with existing toilet facilities including bowl and seat for irradiating the seat when not in use, said unit comprising a casing, an ultraviolet arc lamp therein, an electric circuit connected to the lamp to maintain a potential difference across the arc sufficient to support the arc discharge, said circuit including a connecting member for connecting the unit with a supply line, a circuit in parallel with the arc path including normally open switch contacts and adapted when said contacts are closed to decrease said potential difference and interrupt the discharge, and a housing for said switch contacts that is deformable under compression to close said contacts, said contacts and housing being connected to the unit by flexible conductors.

8. A unit of the type described that is adapted for attachment to and use with existing toilet facilities including a bowl and a seat pivoted to swing between an upright position and a lowered position on said bowl, said unit comprising a casing and means for mounting said casing in a fixed upright position at the rear of the seat leaving said seat free to swing about its pivot as aforesaid, a source of ultraviolet radiation in said

7

casing, means for directing the radiation downwardly to irradiate the plan area of the bowl and seat, an energizing circuit for said source, and means for deenergizing said source when said seat is in use comprising switch means connected in said circuit and compressible by the added weight on said seat when in use.

9. A unit as defined in claim 8, said switch means being adapted for attachment to the under side of said seat and connected to said casing by flexible conductors.

10. A unit as defined in claim 8, said bowl having fixed pivot supports for said seat, said casing having supporting feet adapted to engage said supports for mounting said casing on said bowl.

11. A unit as defined in claim 8, said radiation directing means comprising reflector means in

8

said casing behind said source and downwardly inclined louvers in the front of said casing.

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