Jan. 4, 1949. H. H. NILES 2,458,019

METHOD AND MEANS FOR STERILIZING TOILET SEATS

Filed Oct. 26, 1943 2 Sheets-Sheet 1

FIG. 1.

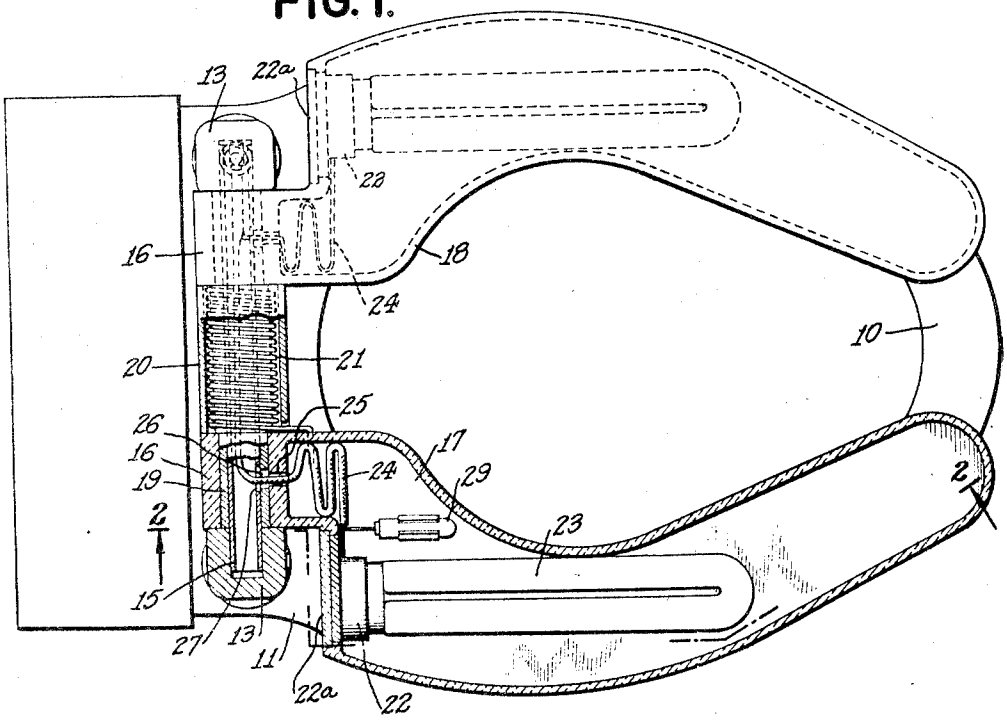
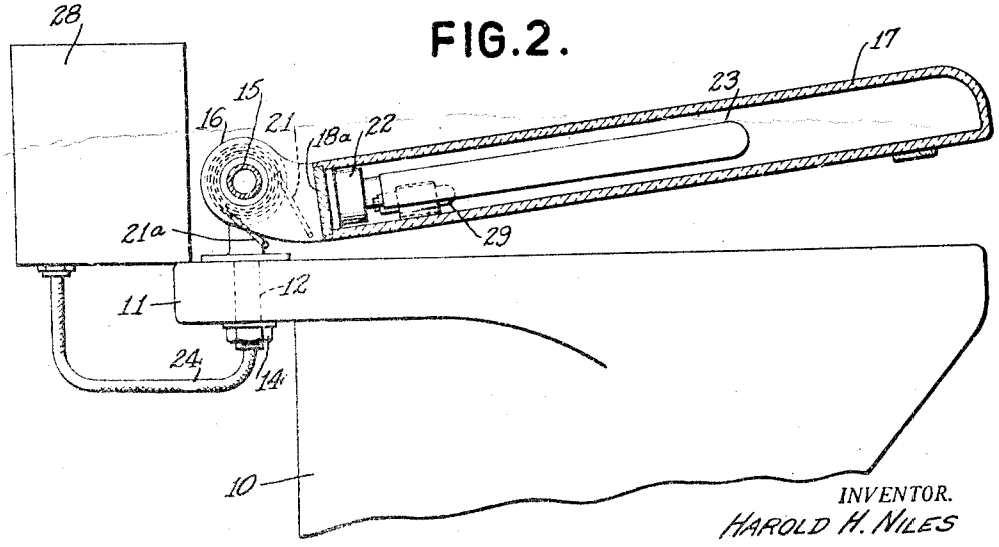


FIG. 2.



INVENTOR.
HAROLD H. NILES

BY H. C. Kliesrud

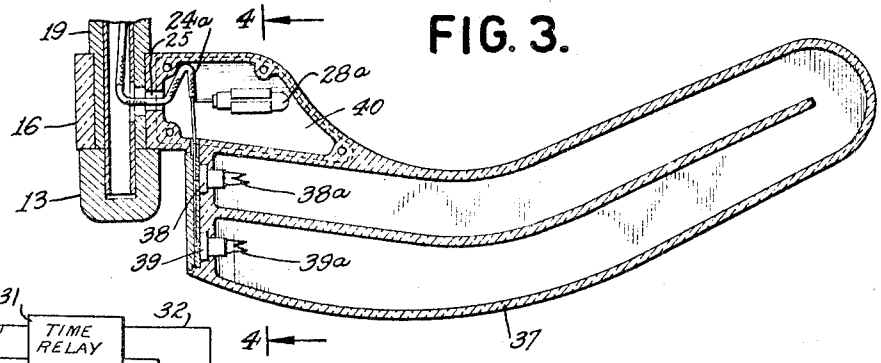
ATTORNEY

Jan. 4, 1949. H. H. NILES 2,458,019

METHOD AND MEANS FOR STERILIZING TOILET SEATS

Filed Oct. 26, 1943 2 Sheets-Sheet 2

FIG. 3.



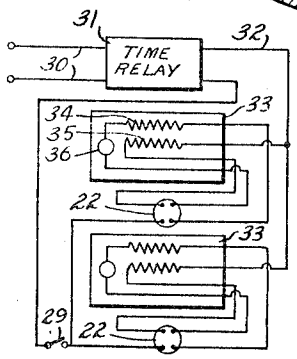


FIG. 7.

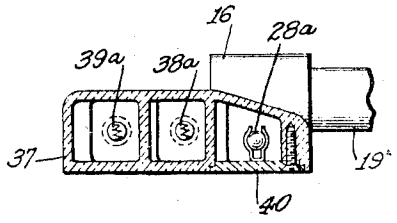


FIG. 4.

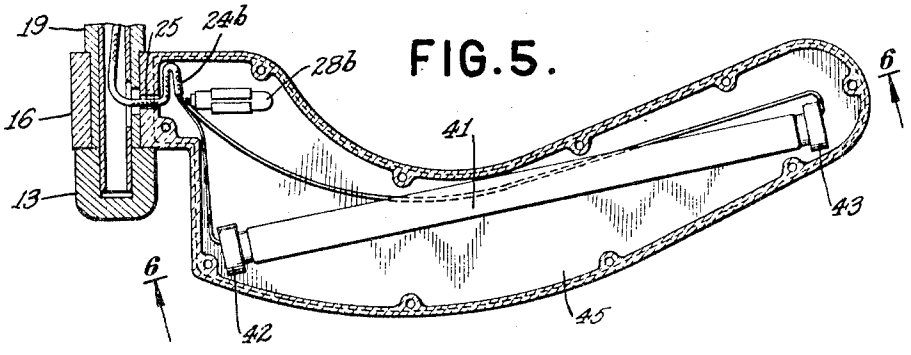


FIG. 5.

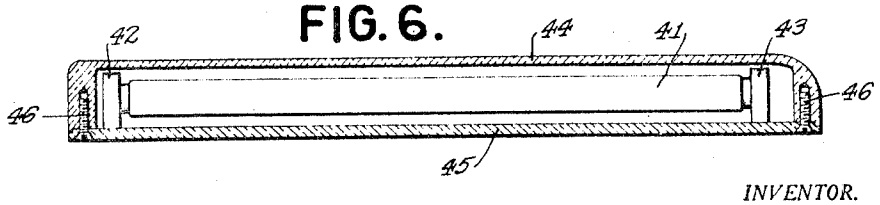


FIG. 6.

INVENTOR.
HAROLD H. NILES
BY
H. C. Klieneng
ATTORNEY

Patented Jan. 4, 1949

2,458,019

UNITED STATES PATENT OFFICE

2,458,019

METHOD AND MEANS FOR STERILIZING TOILET SEATS

Harold H. Niles, Mount Kisco, N. Y., assignor, by mesne assignments, to Edward Spierer, Brooklyn, N. Y.

Application October 26, 1943, Serial No. 507,699

11 Claims. (Cl. 4—233)

1

This invention relates to the sterilization of various articles through the use of radiant energy. An important specific application of the invention is the sterilization of toilet seats, and the like, through the germicidal action of ultra violet light rays or similar forms of radiant energy.

Heretofore various complicated and cumbersome schemes have been employed for the purpose of sterilizing the tops of toilet seats but these have been too expensive for general use and have not been altogether effective.

An object of the present invention has been to provide a simple, inexpensive and effective way of insuring the thorough sterilization of toilet seats, particularly in public toilets, prior to each use thereof, thus guarding against the transmission of diseases from one user to another. Toward this end there is provided, directly within a toilet seat, a source of ultra violet rays or other germ killing radiant energy and the seat, either in its entirety or in such portions as may require sterilization, is made transparent to, or capable of transmitting, the germ killing rays. The seat may for this purpose be formed of a suitable plastic composition, having the requisite properties.

While the invention is particularly suited for the specific use indicated, it may be applied to a wide variety of other fields of use in which similar problems are met. By way of example, it may be used in the sterilization of the mouthpiece or ear-piece of a public telephone, or the discharge outlet of a public drinking fountain with which the lips of the user may come in contact, or it may be used to sterilize the hand-grips or posts or rails provided in public transportation vehicles, or the railings in public buildings, or the like. A phase of the invention may also be utilized in the construction of a cabinet or chest for the sterilization of implements used by doctors or dentists.

Other objects, features and advantages of the invention will appear from a detailed description of several illustrative forms of the same which will now be given in conjunction with the accompanying drawings, in which:

Fig. 1 is a view, partly in top plan and partly in horizontal section, showing a toilet seat and related devices embodying a form of the invention.

Fig. 2 is a view of the same form of the invention, partly in side elevation and partly in section along the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view through a portion of a toilet seat embodying another form of the invention.

Fig. 4 is a transverse sectional view along the line 4—4 of Fig. 3.

Fig. 5 is a view similar to Fig. 3, showing a further modification of the invention.

2

Fig. 6 is a longitudinal section along the line 6—6 of Fig. 5.

Fig. 7 is a diagrammatic view showing a suitable system of electrical connections which may be employed in connection with the various forms of the invention.

Referring now particularly to Figs. 1 and 2 of the drawings, there is shown a suitable application of the invention to the problem of sterilizing a toilet seat. The toilet may be of any conventional or known construction, preferably having a bowl 10 adapted to be flushed by water from a suitable source, not shown. Flushing may be accomplished either under manual or foot control or automatically through the movement of the seat and the water for the purpose may be derived either from a storage tank or from a pressure line. A rearward extension 11 at the top of the bowl is suitably apertured to receive the shanks 12 of a pair of seat supporting brackets 13. The lower ends of the shanks 12 may be screw-threaded and provided with nuts 14 to secure them to the extension 11. A hollow or tubular pivot element 15 between the brackets 13 is either journaled or held stationary in laterally disposed recesses therein. Rearward extensions 16 of a pair of seat sections 17 and 18 are apertured to receive the pivot element 15. Preferably a bushing 19 is provided in the aperture in each of the extensions 16 for bearing engagement with the pivot element, or, if desired, a single bearing sleeve may cooperate with both seat extensions. The arrangement may be such that the sleeve or bushings and their connected seat members turn freely upon the pivot element 15 or the latter may turn freely in the recesses of the brackets 13. Between the extensions 16 of the seat sections there is a small spacing sleeve 20 which may, if desired, be secured at its ends to the seat sections to cause the latter to swing as a unit about the pivot element. A spring 21 surrounding the pivot element 15 within the sleeve 20 may have one end passed laterally through the extension 16 of the seat section 18 and then directed downwardly, as indicated at 21a in Fig. 2, to engage the bracket 13. The opposite end of the spring may be passed outwardly through the wall of the sleeve 20 and have a bent-over portion inserted in a suitable aperture in the inner side wall of the seat section 17. Spring 21 is preferably so tensioned, normally, as to hold the seat raised slightly from the top of the bowl in the position indicated in Fig. 2. The seat may, however, be raised into a vertical position, whenever desired, the one end of the spring 21 being then simply carried away from the bracket 13. When in use the seat will, of course, be depressed against the top of the bowl against the action of the spring.

Each of the seat sections 17 and 18 is of hollow

construction and is preferably formed of a plastic substance capable of transmitting germicidal rays, such as ultra violet rays. For this purpose, certain of the acrylic resins may be used, such as are available under the trade-names "Lucite" and "Plexiglas." Other forms of synthetic resin, capable of transmitting a high percentage of the ultra violet rays or other germicidal rays, may be used. So also, regenerated cellulose, which has the indicated property, may be employed or quartz glass may be used, if adequate provisions are made for preventing breakage. If desired, the under portion of each seat section may be formed of a different material, which need not be capable of transmitting the germicidal rays, since it is of primary importance to direct the rays over the upper and side surfaces of the seat sections. The inner surface of the bottom wall of each seat section may, in fact, be provided with a reflecting finish or coating which will serve to concentrate the rays on the upper portion of the seat.

Within each of the seat sections there is mounted a lamp-retaining socket **22** adapted to receive a commercially available form of germicidal lamp. The socket **22** is preferably mounted upon a detachable plate or section **22***a* at the inner end of the related seat section. This will enable the ready insertion and removal of the lamp **23** in the socket. An electric cable or conduit **24**, carrying the necessary wires for the particular circuit involved, may extend from the socket **22**, in each of the seat sections, through an aperture **25** in the wall of the extension **16** surrounding the bushing **19**, then through an aperture **26** in this bushing and through an elongated opening **27** in the pivot element **15**. If the pivot element is adapted to rotate in the brackets **13**, the opening **27** may simply be an aperture alined with the apertures **25** and **26** or may be elongated slightly in an axial direction. However, if the pivot element is held stationary and the bushings **19** are adapted to rotate about the pivot element, the opening **27** must be of adequate length circumferentially to permit the necessary movement of the cable **24**. The cable extending from the seat section **17** is passed through the hollow of the pivot element **15** and is joined with the cable from section **18**, the combined cables being then passed downwardly through the hollow interior of one of the brackets **13**. From the lower end of this bracket the cable may be passed to a box or other enclosure **28** suitably mounted in rear of the toilet seat, or, if desired, at some more remote point.

For the purpose of controlling the operation of the lamps **23**, a mercury switch **29** may be provided within one or each, of the sections of the seat. As shown in Fig. 1, such a switch may suitably be provided in the section **17** and adapted to control the operation of the lamps in both sections. The arrangement may be such, for example, that so long as the seat is tilted into the Fig. 2 position, or is raised into its vertical position, the switch will be closed and the lamps placed in operation. Whenever the seat is in use, however, the mercury switch will have its forward end tilted downwardly into a position in which the current to the lamps will be cut off. Such a simple control of the lamps will be satisfactory in installations in which the toilet seat is in frequent use. However, in installations in which the toilet is used only at widely varying and infrequent intervals, it will be desirable to include in the circuit a suitable form of time

relay. This may be so connected in the circuit that after the circuit has been closed by the tilting of the mercury switch into its closed position, in the manner indicated above, the circuit will be held closed for only a predetermined period of, say, between thirty seconds and a minute or two. Germicidal lamps have been found effective for the killing of most types of germs within a relatively short period of time, particularly at such a short distance as is involved in the present invention. In lieu of controlling the operation of the lamps by a mercury switch, it may be controlled by a push button or by a coin-controlled device or the like. For example, a person desiring to use the toilet may simply press a button or insert a coin in a slot and the lamps may then be lighted for a predetermined period sufficient to produce the desired germicidal action.

Referring now to Fig. 7, there is indicated diagrammatically an illustrative form of electrical circuit which may be employed in the practice of the invention. Power may be derived from a power line **30** which may be connected with a time relay **31** of any suitable construction mounted, for example, in the box **28**. One terminal of the output side of the time relay may be connected by a line **32** with one terminal of each of a pair of ballasts **33** which may also be suitably mounted within the box **28**. Ballasts **33** may be of conventional construction and each may embody reactance coils **34** and **35** appropriately connected with the time relay and with the lamp sockets **22**. The coil **34**, for example, may be connected at one end with one of the four terminals of the socket **22** and at its other end with a starter **36** which is in turn connected with another terminal of the socket **22**. Coil **35** may have one end connected with the line **32** and the other end connected with a third terminal of the socket **22**. A fourth terminal of socket **22** may then be connected with the mercury switch **29**, or other control switch, which is in turn connected back to the time relay.

In the operation of this form of the invention, the seat **17**, **18** will be lifted by the spring **21** into the position indicated in Fig. 2 when the occupant rises. This will cause a sufficient tilting of the mercury switch **29** to close the circuit through this switch, the lamps **23**, the ballasts **33**, and the relay **31**. After a predetermined period the relay will operate to open the circuit and the seat is then ready for use again. During the operation of the lamps, the germicidal rays will be thrown against all surfaces of the seat sections and by virtue of the transparency of these sections to the rays, the latter will reach and destroy any germs on the outer surfaces of the seat.

Referring now to Fig. 3, a modified construction is illustrated in which the germicidal lamp forms an integral part of the seat itself. Thus, the seat section **37** may have its entire length constitute a germicidal lamp of a type similar to the lamp **23**. The cable **24***a* may have certain of its wires connected directly with pairs of terminals **38** and **39** passing through the wall of the seat section at its inner end and connected with filaments **38***a* and **39***a* within the seat section. The hollow interior of the seat section will be evacuated and a small amount of mercury and argon gas, or the like, introduced, just as in the manufacture of the germicidal lamps themselves. When this construction is employed, the material of which the seat section **37** is formed must be of a special type, which is not only transparent

to the germicidal rays but is also impervious to gases and substantially impervious to water vapor. It may, for this purpose, be formed of quartz glass or of resins, of the type hereinabove specified, which have been specially treated or composed to render them gas-tight and substantially vapor-proof. The control of the operation of this form of the invention may be by any of the means hereinabove suggested, such as a mercury switch **28***a* connected in the circuit in the same manner as before explained. It will be apparent that in this form of the invention the germicidal action will be extremely effective since all portions of the seat surface will be subjected directly and at close range to the action of the germicidal rays developed within the seat. As best shown in Fig. 4, a small section of the seat which houses the mercury switch **28***a* may be provided with a removable base **40** for access to the mercury switch.

In Fig. 5 a further modification of the invention is disclosed. This form of the invention is adapted for use of a different style of germicidal lamp **41**, which is mounted in sockets **42** and **43** at its opposite ends. These sockets may be suitably connected with the cable **24***b* and the control switch **28***b* and the construction as a whole, together with its connection into the electrical circuit, may otherwise be substantially the same as for the Fig. 1 embodiment. For ease of access to the interior of the seat section, it is preferably formed in two parts, i. e., an upper part **44** providing the top and side walls of the hollow seat and a bottom member **45**, these two parts being secured together in any convenient way as by a series of screws **46**. With this type of construction the two parts of the seat section may be formed of different materials, if desired. For example, only the upper part **44** need be made of a material capable of transmitting the germicidal rays. The lower part **45** may, in such a case, be provided with a reflecting inner or upper surface adapted to intensify the rays thrown against and through the upper part **44**.

While several illustrative embodiments of the invention have been described in considerable detail, it will be understood that the invention is capable of a wide variety of other uses and embodiments, all falling within the scope of the appended claims.

I claim:

1. A toilet seat formed of material which will transmit germicidal rays, said seat having a cavity between the upper and lower surfaces thereof, and means within said cavity for emitting said germicidal rays.

2. A toilet seat formed of a resinous material which will transmit germicidal rays, said seat having a cavity between the upper and lower surfaces thereof, and means within said cavity for emitting said germicidal rays.

3. A toilet seat formed of an acrylic resin which will transmit germicidal rays, said seat having a cavity between the upper and lower surfaces thereof, and means within said cavity for emitting said germicidal rays.

4. A toilet seat formed of material which will transmit germicidal rays, said seat having a cavity between the upper and lower surfaces thereof, and a lamp within said cavity capable of emitting said germicidal rays.

5. A toilet seat formed of material which will transmit germicidal rays, said seat having a cavity between the upper and lower surfaces thereof,

a lamp within said cavity capable of emitting said germicidal rays, a hinge member at one end of said seat, and electrical connections passing through said hinge member to said lamp.

6. A toilet seat formed at least in part of plastic material capable of transmitting germicidal rays, said seat being formed as a gas-tight hollow shell, electrodes passing through a wall of said shell, and means within said shell adapted to emit germicidal rays upon the passage of a current through said electrodes.

7. A tiltable toilet seat formed at least in part of material capable of transmitting germicidal rays, said seat being formed as a gas-tight hollow shell, electrodes passing through a wall of said shell, electrically operated means within said shell adapted to emit germicidal rays upon the passage of a current through said electrodes, and a mercury switch carried by and tiltable with said seat and connected with said electrically operated means for controlling the same said switch becoming operative when the seat is not in use and inoperative when the seat is in use.

8. A tiltable toilet seat formed at least in part of material capable of transmitting germicidal rays, said seat being formed as a gas-tight hollow shell, electrodes passing through a wall of said shell, electrically operated means within said shell adapted to emit germicidal rays upon the passage of a current through said electrodes, a mercury switch carried by and tiltable with said seat and connected with said electrically operated means for controlling the same, and spring means for normally holding said seat in a tilted position in which said switch is closed.

9. A toilet seat having its upper surface formed of a plastic material capable of transmitting germicidal rays, said seat having a cavity between the upper and lower surfaces thereof, and electrically operated means within said cavity adapted to cause the emission of germicidal rays upon the passage of a current therethrough.

10. A toilet seat having a plurality of curved sections, means including a hollow hinge member for uniting said sections, each of said sections having a cavity between its upper and lower surfaces, the upper portions of said sections being formed of a material capable of transmitting germicidal rays, electrically operated means within said cavities adapted to cause the emission of germicidal rays, and electrical connections passing in part through said hinge member for delivering current to said electrically operated means.

11. A toilet seat formed of material adapted to transmit ultraviolet light rays, said toilet seat having a passage formed therein, and a source of ultra-violet rays disposed within said passage.

HAROLD H. NILES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,412,436	Wilkin	Apr. 11, 1922
2,034,388	Cemach	Mar. 17, 1936
2,122,687	Herrmann	July 5, 1938
2,202,095	Delhaye et al.	May 28, 1940
2,215,635	Collins	Sept. 24, 1940
2,253,736	Sullivan	Aug. 26, 1941
2,258,765	James	Oct. 14, 1941
2,261,215	Bird	Nov. 4, 1941