TOILET SEAT AND LID

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ABSTRACT
An apparatus comprising a member having an external surface and a channel extending into the member from a slit in the external surface; wherein the channel has opaque sides adjoining the external surface of the member; the channel width increases and subsequently decreases as the channel extends into the member; and the channel is or contains an optical wave guide. In some instances the apparatus is a toilet comprising an RLS with the toilet seat comprising a side emitting optical fiber. In other instances the apparatus is a toilet lid comprising a graphic image illuminated by at least one optical fiber.
TOILET SEAT AND LID

[0001] This application claims priority to U.S. provisional application No. 60/471128 filed May 15, 2003, incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The field of the invention is remote source lighting.

BACKGROUND OF THE INVENTION

[0003] Remote source lighting systems and methods such as the use of fiber optic and/or prism guides to transmit light are known and provide numerous advantages over more traditional lighting systems and methods. However, known remote source lighting apparatus and methods can still be improved to better achieve such advantages. As such, there is a continuing need for improvements to remote source lighting apparatus and methods.

SUMMARY OF THE INVENTION

[0004] In accordance with an aspect of this invention, toilet seats each comprise a light emitting outer edge, and methods for producing, installing and using such a seat. In preferred embodiments, such toilet seats comprise a channel along their outer edge and a side emitting optical fiber positioned within the channel. Some embodiments will also include one or more illuminators positioned within the seat while alternative embodiments may have illuminators positioned elsewhere on a toilet the seat is coupled to such as in the hinges coupling the seat to the toilet. In some instances, seats may comprise optical fibers positioned in a lower outer corner or in the bottom surface of the seat such that the light emitted by the fibers are visible when the seat is raised.

[0005] Various objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the invention, along with the accompanying drawings in which like numerals represent like components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1A is a perspective view of a toilet embodying the invention.

[0007] FIG. 1B is a side view of the toilet seat shown in FIG. 1A.

[0008] FIG. 1C is a detail cutaway view of the toilet seat of FIGS. 1A and 1B.

[0009] FIG. 2 is a top view of a second toilet seat embodying the invention.

[0010] FIG. 3 is a top view of a third toilet seat embodying the invention.

[0011] FIG. 4 is a top view of a fourth toilet seat embodying the invention.

[0012] FIG. 5 is a top view of a fifth toilet seat embodying the invention.

[0013] FIG. 6 is a top view of a sixth toilet seat embodying the invention.

[0014] FIG. 7A is a perspective view of a toilet embodying the invention.

[0015] FIG. 7B is a side view of the toilet lid shown in FIG. 1A.

[0016] FIG. 7C is a top view of the lid of FIG. 1A.

[0017] FIG. 7D is a cutaway side view of the body of the lid of FIG. 1C.

[0018] FIG. 7E is a top view of the insert of FIG. 1A.

[0019] FIG. 7F is a side view of the insert of FIG. 1E.

[0020] FIG. 7G is a top view of the lid of FIG. 1A.

[0021] FIG. 8A is a top view of the body of a second lid.

[0022] FIG. 8B is a cutaway side view of the lid of FIG. 2A.

[0023] FIG. 9 is a cutaway side view of a second insert.

DETAILED DESCRIPTION

[0024] Referring first to FIG. 1A-1C, a toilet 10 comprises a tank 21, hinge assembly 22, lid 23, seat 100, bowl 24 and base 25. Seat 100 and lid 23 are each shown in a closed position, i.e. positioned adjacent to the rim of bowl 24 as shown in FIG. A. Seat 100 also comprises an integral side emitting optical fiber 110. The term “integral” is used herein to indicate that the side emitting optical fiber is at least partially embedded within body 120 of seat 100 rather than being coupled to an outside surface of body 120. Inclusion of fiber 110 causes seat 100 to have a light emitting outer edge if fiber 110 is also coupled to an illuminator or other light source. As used herein, the term optical fiber refers to a flexible optically transparent fiber, usually made of glass or plastic, through which light can be transmitted by successive internal reflections. A side emitting optical fiber is a fiber adapted to disburse light along its length rather than one adapted to maximize the amount of light transferred from one end to another along the length of the fiber.

[0025] As shown in FIG. 1B, fiber 110 is positioned around the outer edge for seat 100, where the outer edge is the portion of the seat that would be visible to someone viewing a toilet on which the seat and a toilet lid are installed while the seat and lid are in a closed position. If the seat is substantially planar, preferred embodiments will have a fiber positioned in a plane substantially parallel to the plane formed by the seat.

[0026] FIG. 1C illustrates a preferred method of integrating fiber 110 into body 120 of seat 100. Seat 100 comprises a channel 123 along its outer edge and side emitting optical fiber 110 positioned within the channel. Channel 123 intersects surface 121 of seat 100 so as to form slit 122 in surface 121. It is preferred that the diameter of fiber 110 be greater than the width of slit 122 such that fiber 110 is not be compressed or otherwise reduced in diameter if it is to pass through slit 122. As the terms are used herein, the width of slit 122 is the distance between points 122A and 122B shown in FIG. C where points 122A and 122B lie in a plane perpendicular to the plane formed by channel 123. It is contemplated that body 120 may be any toilet seat into which an appropriate channel can be formed either during or after the formation of the seat. In preferred embodiments body 120 is opaque such that light emitted by fiber 110 is substantially blocked by the wall(s) of channel 123 such that a majority, if not all, of the light emitted by fiber 110 is only
visible through slit 122. Channel 123 is preferably shaped to have a cross sectional area shaped like a truncated circle.

[0027] Fiber 110 may be coupled to body 120 or some other device by (a) providing a device having channel extending into the device from a slit in the external surface of the device; (b) providing an optical fiber; (c) increasing the malleability of the optical fiber; (d) inserting the fiber into the channel; and (f) causing the malleability of the fiber to decrease. The malleability of fiber 110 can be increased by heating the fiber and subsequently decreased by allowing the fiber to cool. In some instances, one might also apply an adhesive to the fiber or to the interior of the channel prior to inserting the fiber into the channel. In most instances one would also couple at least one end of the fiber to an illuminator.

[0028] In preferred embodiments fiber 110 is polytetrafluoroethylene (Teflon™) coated and sealed into groove 123 with epoxy, silicon glue, some type of pliable adhesive and/or bonding material so as to fill substantially all of any spaces positioned between fiber 110 and the wall(s) of groove 123. Once positioned within the channel, it is contemplated that a transparent or translucent coating may be applied to body 120 such that the coating helps fill and seal off slit 122 and channel 123. In some instances such a coating may form a surface on seat 100 that helps protect fiber 110 and body 120.

[0029] As toilet seats come in different sizes and shapes, different seats may have optical fibers integrated differently. As an example, a seat that is a closed oval may comprise a single fiber and a single illuminator such as is shown in FIG. 2, or may comprise multiple fibers and multiple illuminators as is shown in FIG. 5. In addition to those shown in FIGS. 2 and 5, alternative embodiments are shown in FIGS. 3, 4, and 6.

[0030] In FIG. 2, seat 200 comprises a fiber 210 having ends 211 and 212, a body 220, an illuminator 230, and one or more conductors 240. As can be seen in FIG. 2, fiber 210 is positioned on the outer edge 202 (not inner edge 201) of seat 200 and with end 211 being coupled to illuminator 211, and end 212 terminating inside body 220. Illuminator 230 comprises one or more LEDs or other light sources and fiber 210 is adapted to emit light transmitted to it by illuminator 230 along the length of fiber 210. As can be seen, in seat 200, optical fiber 210 comprises two ends positioned within the seat and at least one illuminator positioned within the seat adjacent to at least one end of the fiber.

[0031] In FIG. 3, seat 300 comprises a fiber 310 having ends 311 and 312, a body 320. Seat 300 is coupled to a toilet (not shown) via hinges 22A and 22B where hinge 22A comprises an illuminator 330 and one or more conductors 340. As can be seen in FIG. 3, fiber 310 is positioned on the outer edge 302 (not inner edge 301) of seat 300. End 311 of fiber 310 extends out of body 320 into hinge 22A and is coupled to illuminator 311. End 312 of fiber 310 terminates inside body 320. Fiber 310 also comprises a segment 314 that extends through body 320 from the channel holding a majority of the fiber to the point at which the fiber emerges from body 320 adjacent to hinge 22A. Illuminator 330 comprises one or more LEDs or other light sources and fiber 310 is adapted to emit light transmitted to it by illuminator 330 along the length of fiber 310.

[0032] In FIG. 4, seat 400 comprises two side emitting optical fibers 410A and 410B, body 420, illuminators 430A and 430B and a hinge assembly comprising hinges 22A and 22B and connecting member 22C. Fibers 410A and 410B each comprise two ends 411A, 412A, 411B, and 412B. As shown in the Figures, fibers 410A and 410B are positioned on opposite sides of outer edge 402 of seat 400. Ends 412A and 412B of fibers 410A and 410B terminate inside of body 420, while ends 411A and 411B extend outward from body 420 into hinges 22A and 22B. Hinge 22B comprises illuminator 430B while hinge 22A comprises illuminator 430A. Illuminator 430B is coupled to illuminator 430A via one or more conductors 440B passing through member 22C. Power to illuminators 430A and 430B is provided via one or more conductors 440A. Ends 411A and 411B of fibers 410A and 410B are coupled to illuminators 430A and 430B. As can be seen, seat 400 comprises at least two channels positioned along its outer edge and at least two side emitting optical fibers wherein at least one optical fiber is positioned within each of the at least two channels. It can also be seen that seat 400 comprises at least one illuminator positioned adjacent to at least one end of each of the at least two side emitting fibers. It can also be seen that at least one end of each of the at least two fibers extends out of the seat, wherein each end extending out of the seat is positioned adjacent to an illuminator positioned outside of the seat.

[0033] In FIG. 5, seat 500 comprises fibers 510A and 50B, body 520 having an inner edge 501 and an outer edge 502, illuminators 530A and 530B and conductor pairs 540A and 540B. Seat 500 is similar to seat 400 of FIG. 4 except that the two illuminators 530A and 530B are both positioned within body 520 rather than in a hinge assembly.

[0034] In FIG. 6, seat 600 comprises fibers 610A and 610B, body 620 having an inner edge 601 and an outer edge 602, a bi-directional illuminator 630 and one or more conductors 640. Ends 611A and 611B of fibers 610A and 610B are each coupled to opposite ends of illuminator 630, while ends 612A and 612B terminate within body 620. Seat 600 is similar to seat 500 of FIG. 5 except that it comprises a single bi-directional illuminator rather than a pair of illuminators.

[0035] Referring first to FIG. 7A, a toilet 710 comprises a tank 721, hinges 722A and 722B, lid 800, seat 723, bowl 724 and base 725. Lid 800 and seat 723 are each shown in a closed position, i.e. positioned adjacent to the rim of bowl 724 as shown in FIGS. 7A and 7B. Lid 800 also comprises an integral side emitting optical fiber 810, a graphic 830, and a transparent or translucent (“non-opaque”) insert 840. The term “integral” is used herein to indicate that the side emitting optical fiber is at least partially embedded within body 820 of lid 800. Inclusion of fiber 810 causes insert 840 and graphic 830 to be backlit by fiber 810 if fiber 810 is also coupled to an illuminator or other light source such as illuminator 852 of FIG. 7C. As used herein, the term optical fiber refers to a flexible optically transparent fiber, usually made of glass or plastic, through which light can be transmitted by successive internal reflections. A side emitting optical fiber is a fiber adapted to disburse light along its length rather than one adapted to maximize the amount of light transferred from one end to another along the length of the fiber.

[0036] FIG. 7C depicts lid 800, without insert 840 and graphic 830, coupled to hinges 722A and 722B. In FIG. 7C, one or more conductors 851 are used to provide power
and/or data signals to illuminator 852. Illuminator 852 in turn transmits light into fiber 810 which is laid out in a grill pattern along the back of cavity 821 which is sized and dimensioned to receive insert 840. FIG. 7D is a cutaway side view of lid 800 that more clearly shows the relationship between fiber 810, cavity 821, and insert 840 when insert 840 is positioned in cavity 821. As shown in FIGS. 7E and 7F, graphic 830 is preferably positioned on a surface of insert 840 such that when insert 840 is inserted into cavity 821 of body 820 of lid 800 as shown in FIGS. 7D and 7G, light from fiber 810 backlights graphic 830.

[0037] FIG. 8A illustrates a lid which sidelights rather than backlights a graphic. In FIG. 8A, lid 900 comprises fiber 910, body 920, cavity 921, illuminator 950, hinges 722A and 722B and one or more conductors 851. As shown in more detail in FIG. 8B, fiber 910 is positioned around the circumference of cavity 921. If body 920 is opaque, light emitted by fiber 910 will essentially be visible only as it is emitted by non-opaque insert 940.

[0038] FIG. 9 illustrates an alternative insert 950 wherein fiber 951 is positioned in insert 950 rather than in the body of a toilet seat lid.

[0039] As can be seen in the Figures, a toilet may comprise one or more optical fibers and/or one or more illuminators where the illuminators may be positioned within the seat body or in a hinge. It is contemplated that less preferred embodiments may position one or more illuminators elsewhere on the toilet, or may even position one or more illuminators someplace other than in or on the toilet.

[0040] It is contemplated that the method of integrating an optical fiber into a toilet seat shown in the Figures could be applied to other apparatus as well. Such apparatus would typically have a member having an external surface and a channel extending into the member from a slit in the external surface; wherein the channel has opaque sides adjoining the external surface of the member; the channel width increases and subsequently decreases as the channel extends into the member; and the channel is or contains an optical wave guide. In many such apparatus such as the toilet seat described above the channel will contain a side emitting optical fiber having a diameter greater than the width of the slit, and the apparatus will be formed by subjecting the fiber to a process that increases its malleability prior to its being inserted into the channel via the slit. Such apparatus will typically also have an adhesive is position between at least some portions of the fiber and at least some portions of the channel.

[0041] It is contemplated that apparatus as described above may include almost any apparatus in which a groove may be formed. However, it is contemplated that apparatus that are vehicles, building members, building materials, articles of clothing and/or pieces of furniture may be particularly enhanced by having a side emitting optical fiber integrated into them. Such apparatus may include but are not necessarily limited to wheelchairs, golf carts, baby carriages, bicycles, motorcycles, automobiles, trucks, vans, sport utility vehicles, tanks, submarines, shoes, jackets, vests, hats, helmets, baby cribs, floors, walls, ceilings, counter tops, tiles, and wood. If optical fibers are integrated into building structures, they may be used to define one or more paths between locations.

[0042] Thus, specific embodiments, applications, and methods relating to remote source lighting systems have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

What is claimed is:

1. An apparatus comprising:
   a member having an external surface and a channel extending into the member from a slit in the external surface; wherein
   the channel has opaque sides adjoining the external surface of the member;
   the channel width increases and subsequently decreases as the channel extends into the member; and
   the channel is or contains an optical wave guide.

2. The apparatus of claim 1 wherein the channel contains a side emitting optical fiber having a diameter greater than the width of the slit.

3. The apparatus of claim 2 wherein the apparatus is formed by subjecting the fiber to a process which increases its malleability prior to its being inserted into the channel via the slit.

4. The apparatus of claim 3 wherein an adhesive is position between at least some portions of the fiber and at least some portions of the channel.

5. The apparatus of claim 4 wherein the channel has a cross sectional shape of a truncated circle.

6. The apparatus of claim 5 wherein the member is a toilet seat having an outside edge and the channel is positioned along a portion of the outside edge of the seat.

7. The apparatus of claim 1 wherein the apparatus is a vehicle.

8. The apparatus of claim 7 wherein the vehicle is a wheelchair, golf cart, baby carriage, bicycle, motorcycle, automobile, truck, van, sport utility vehicle, tank, or submarine.

9. The apparatus of claim 1 wherein the apparatus is an article of clothing.

10. The apparatus of claim 9 wherein the article of clothing is a shoe, jacket, vest, hat, or helmet.

11. The apparatus of claim 1 wherein the apparatus is at least one of a piece of furniture, a building member, a floor, a wall, and a ceiling.

12. The apparatus of claim 14 wherein the wave guide defines a path between locations.

13. A toilet comprising at least one of (a) a seat with a light emitting outer edge and (b) a lid having a graphic image illuminated by at least one optical fiber.

14. The toilet of claim 13 wherein the seat comprises a channel along its outer edge and a side emitting optical fiber positioned within the channel.
15. The toilet of claim 13 wherein the optical fiber comprises two ends positioned within the seat and at least one illuminator positioned within the seat adjacent to at least one end of the fiber.

16. The toilet of claim 17 wherein the seat comprises at least two channels positioned along its outer edge and at least two side emitting optical fibers wherein at least one optical fiber is positioned within each of the at least two channels.

17. The toilet of claim 13 wherein the at least one optical fiber is at least partially embedded in the seat.

18. The toilet of claim 13 wherein the graphic image comprises a photo, sketch, or text.

19. The toilet of claim 13 wherein the image is backlit by the one or more embedded fibers.

20. The toilet of claim 13 wherein the graphic image is positioned on an acrylic insert removably coupled to an opaque frame, the insert being positioned adjacent to at least one of the one or more embedded fibers.

21. The toilet of claim 13 wherein one or more fibers at least partially surround the insert.

22. The toilet of claim 13 wherein the one or more fibers are positioned in a groove in an opaque portion of the lid such that a majority of any light emitted by the lid is emitted by the insert.

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