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Lee(10) **Pub. No.: US 2007/0294814 A1**(43) **Pub. Date: Dec. 27, 2007**(54) **VENTILATED TOILET APPARATUS AND
DUAL FUNCTION TOILET SEAT****Publication Classification**(51) **Int. Cl.**
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(57) **ABSTRACT**(76) Inventor: **Younghee Lee, Blue Bell, PA (US)**

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PARK LAW FIRM**3255 WILSHIRE BLVD, SUITE 1110****LOS ANGELES, CA 90010**(21) Appl. No.: **11/733,688**(22) Filed: **Apr. 10, 2007****Related U.S. Application Data**

(60) Provisional application No. 60/816,280, filed on Jun. 23, 2006, provisional application No. 60/854,674, filed on Oct. 25, 2006.

A ventilated toilet apparatus includes a toilet seat assembly, a pivot, a hinge assembly. The toilet seat assembly comprises a number of intake apertures, air passageways, and an exhaust conduit. The pivot is a hollow tube having a plurality of apertures in the middle section. The hinge assembly comprises a receptive opening and an axial post. The receptive opening receives the pivot, which is firmly attached to the toilet seat assembly. The axial post allows an airflow communication between the toilet seat assembly and the suction device. The toilet seat assembly, pivot, and hinge assembly are disposed in communication with a suction device to eliminate foul air. Addition of a heating unit to a toilet seat body provides a dual function apparatus which can be warmed to several temperature settings. Incorporation of ventilation and warm seat functions in a single unit would provide the bathroom users maximum comfort and enjoyment.

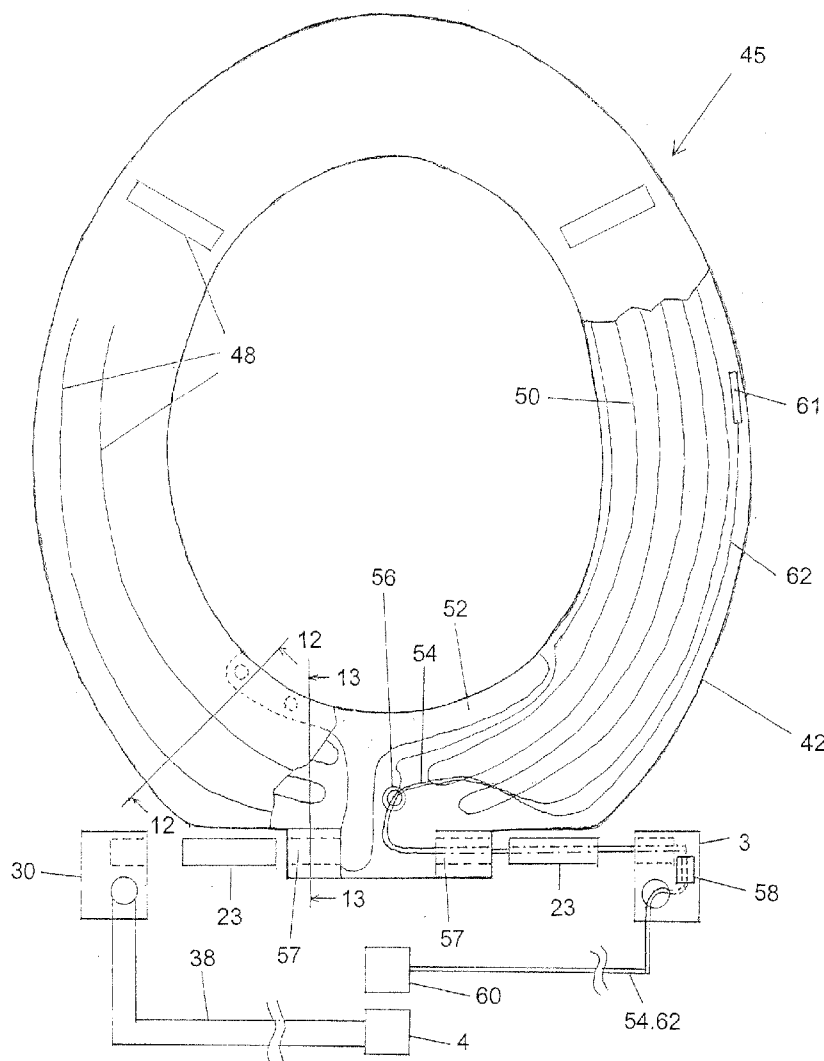
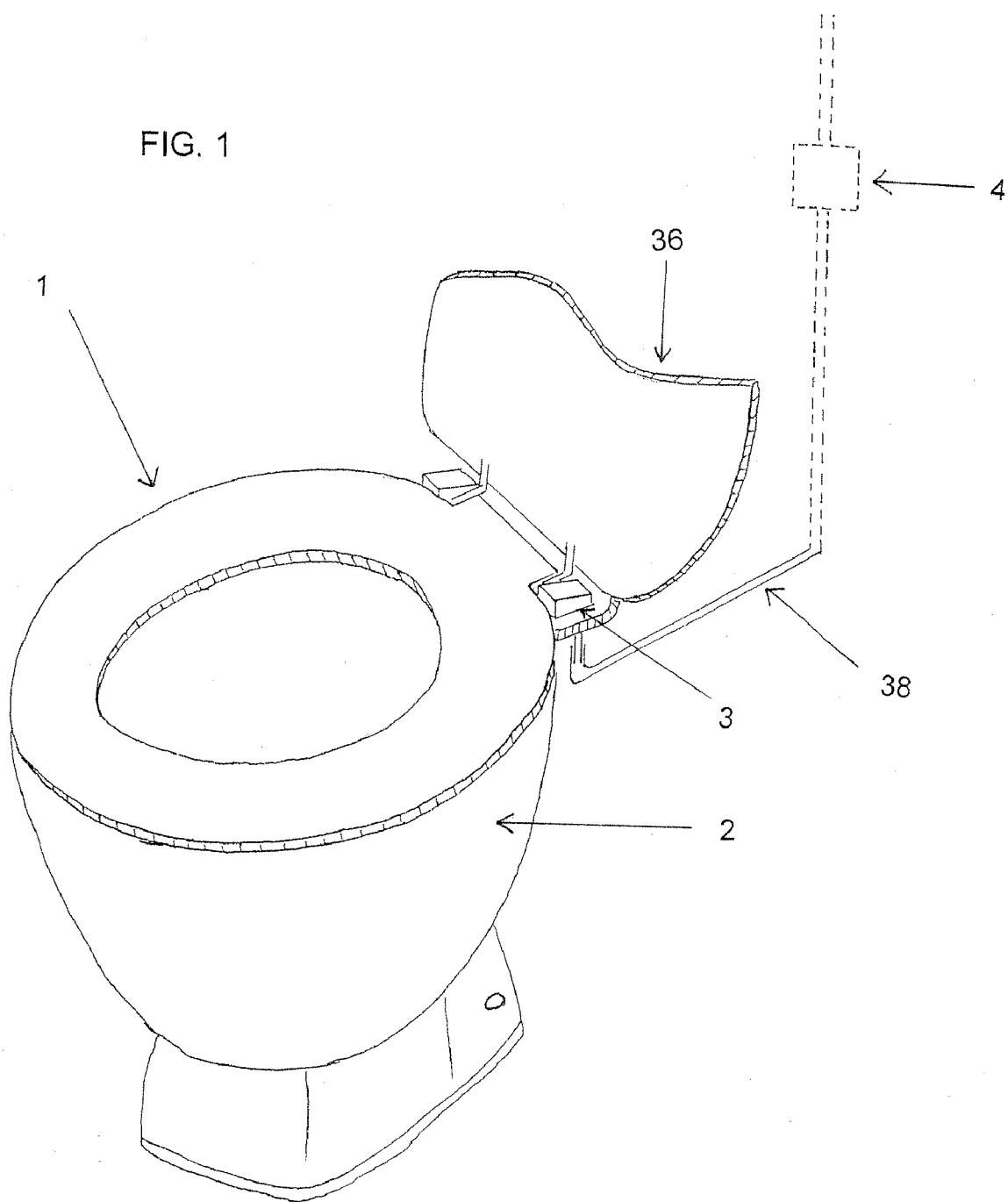
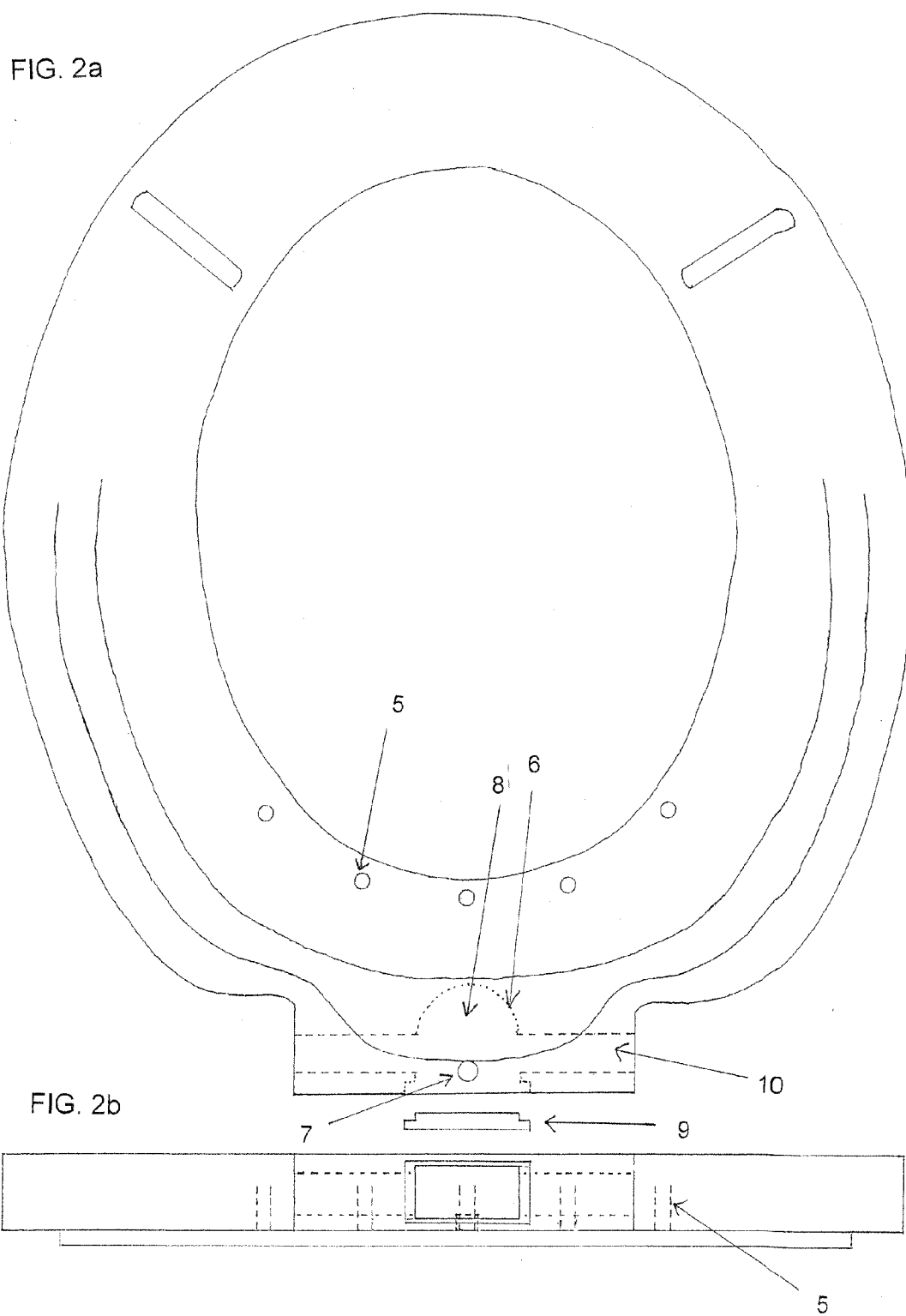


FIG. 1





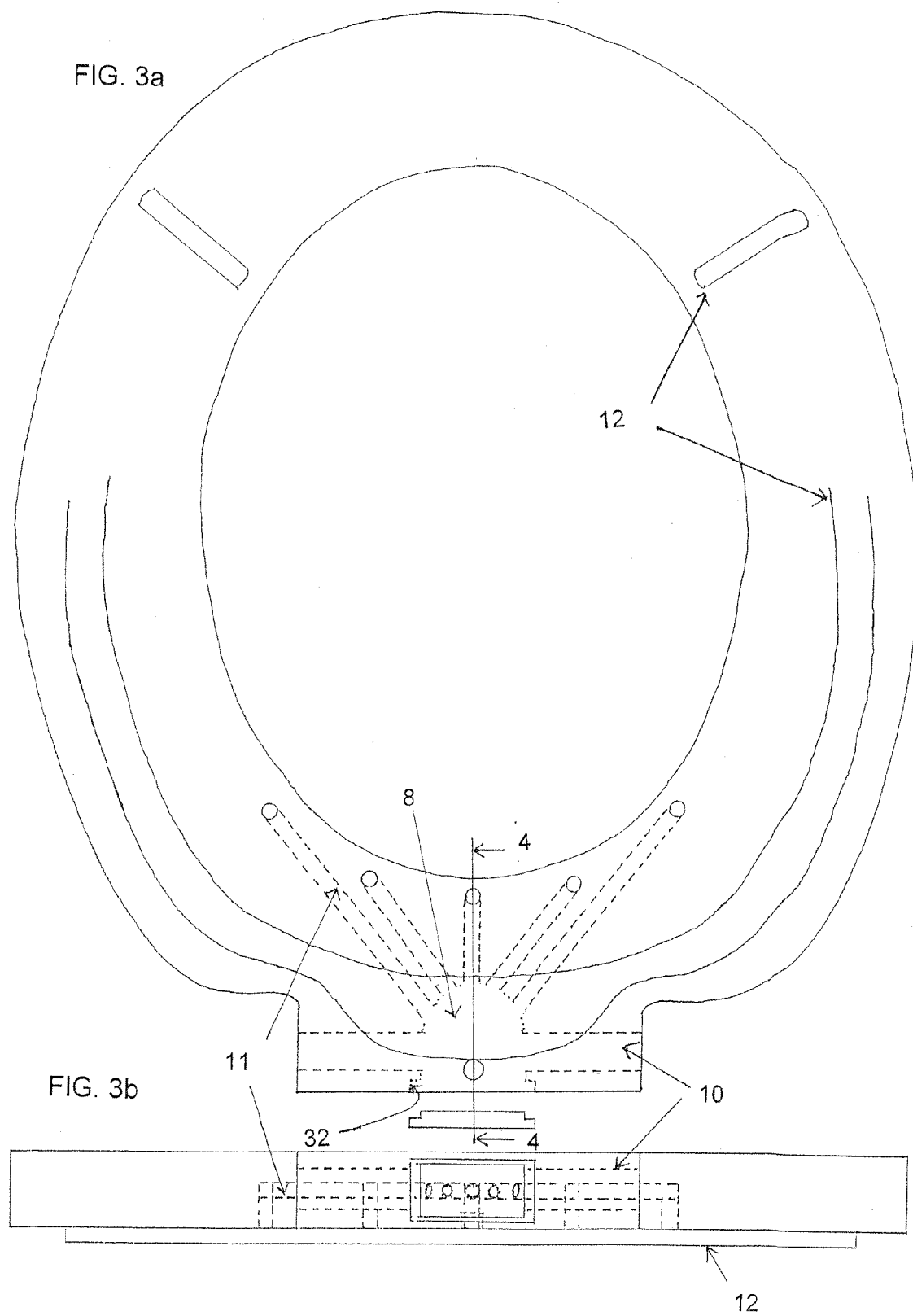


FIG. 4

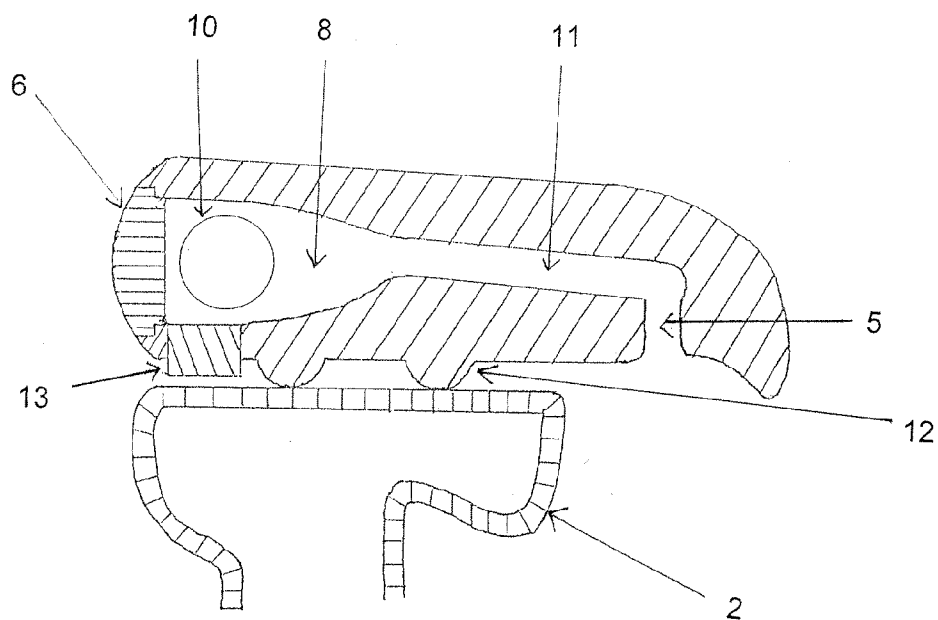


FIG. 5

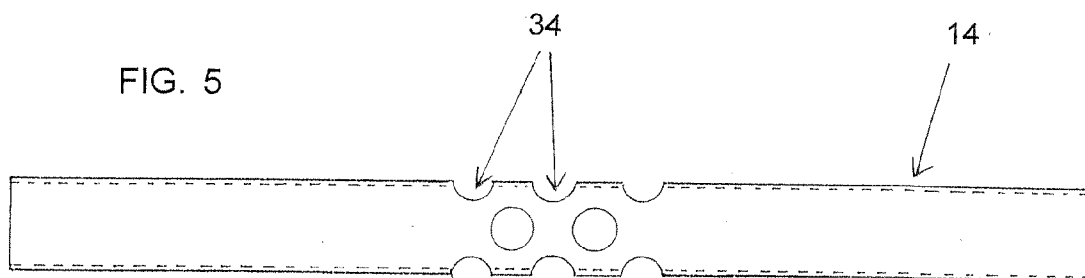


FIG. 6a

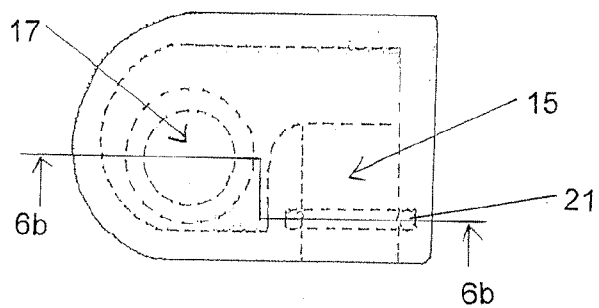


FIG. 6b

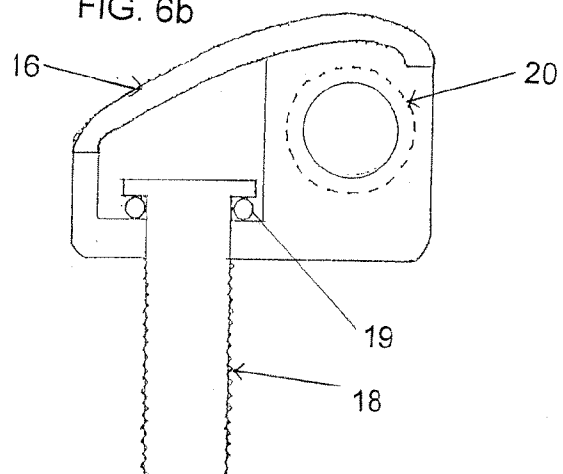


FIG. 6c

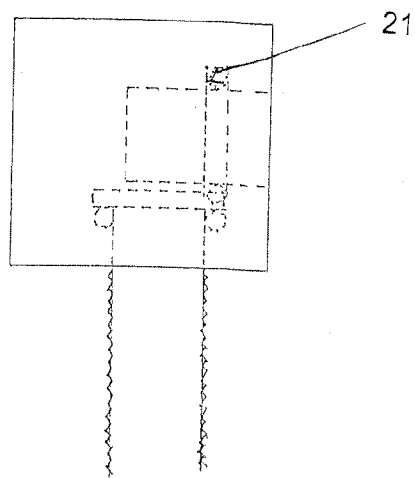


FIG. 7

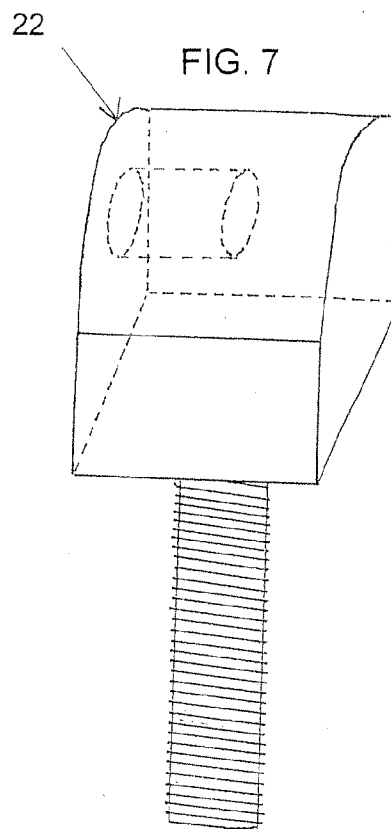


FIG. 8

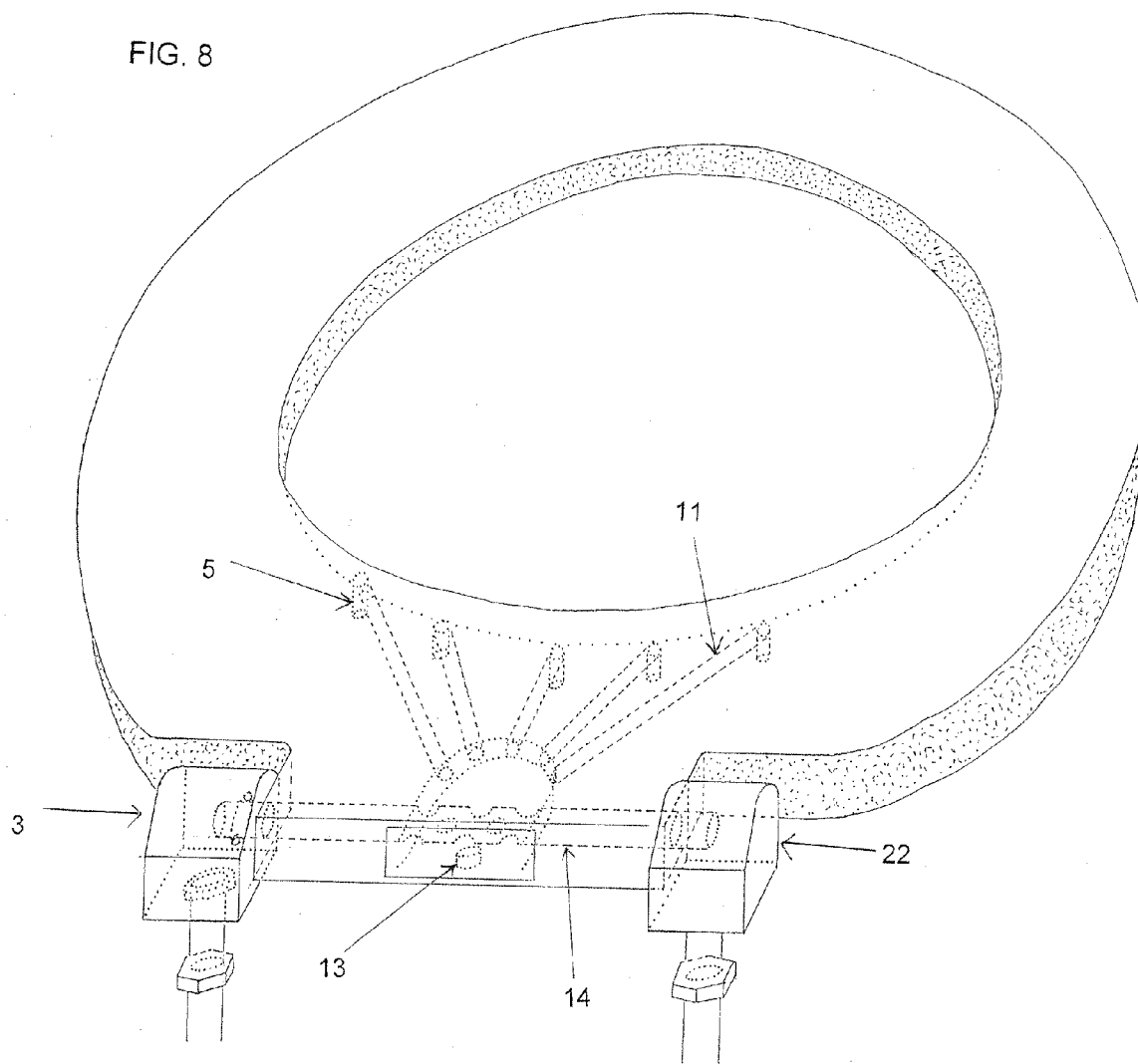


FIG. 9a

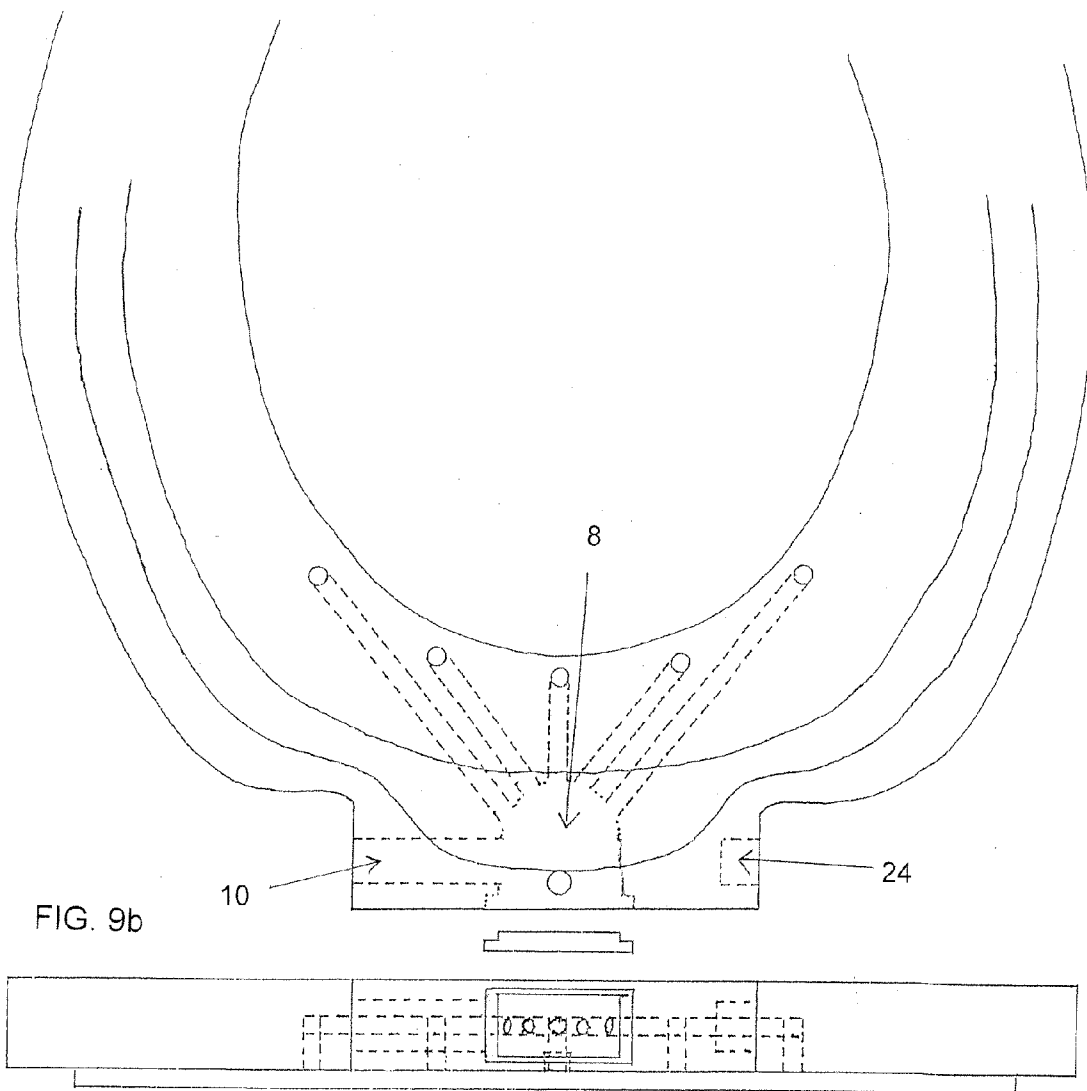
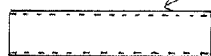


FIG. 9c



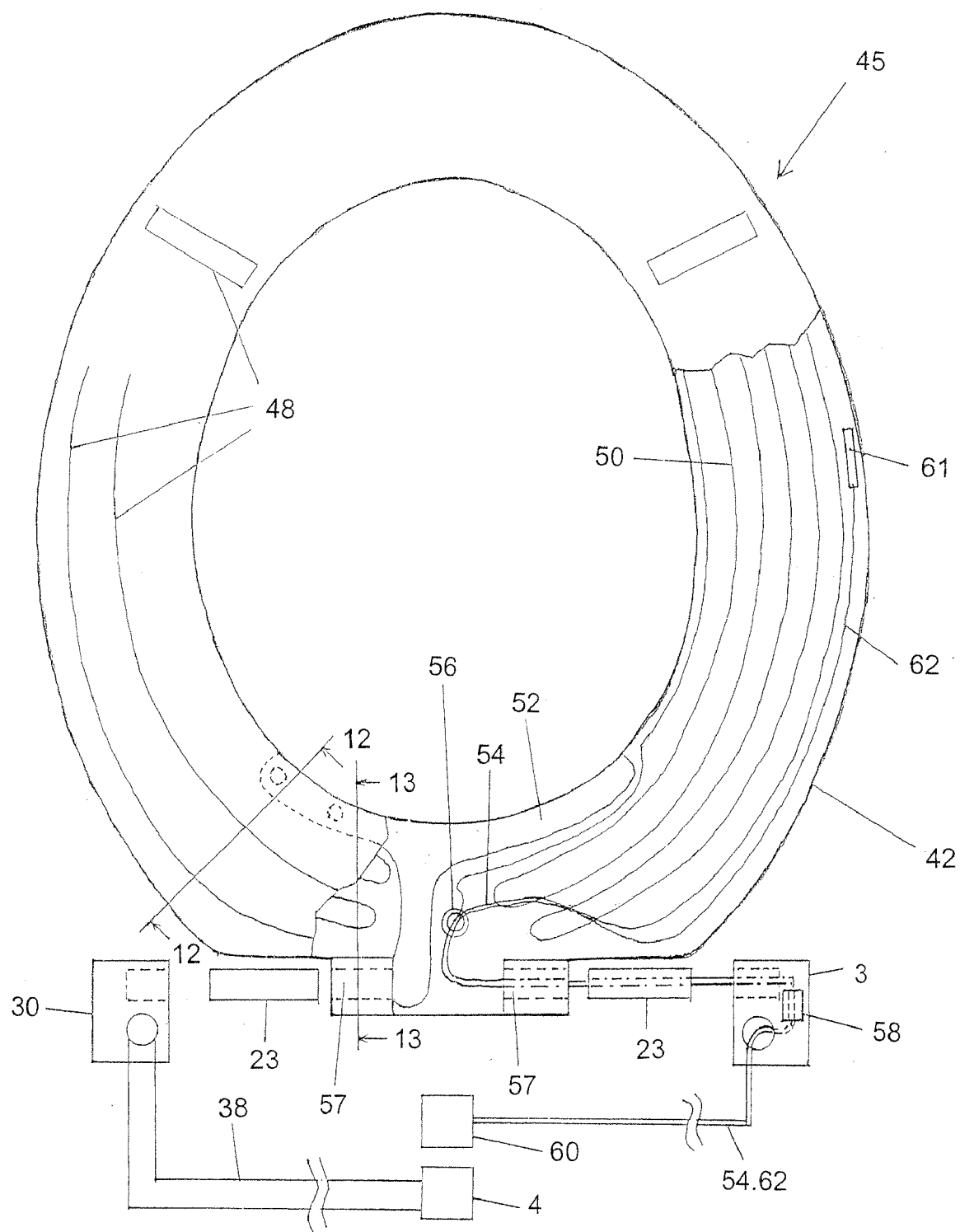


FIG. 10

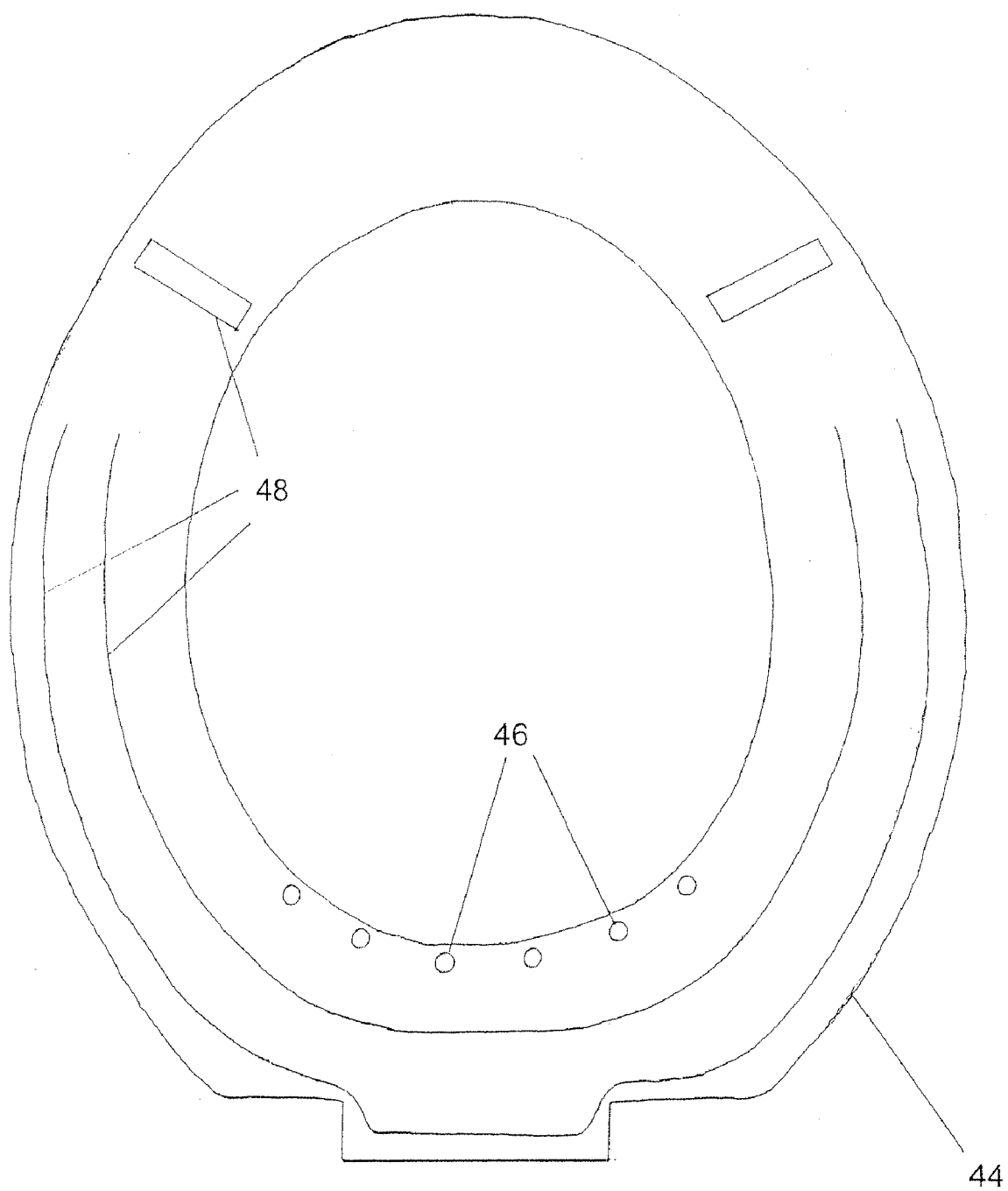
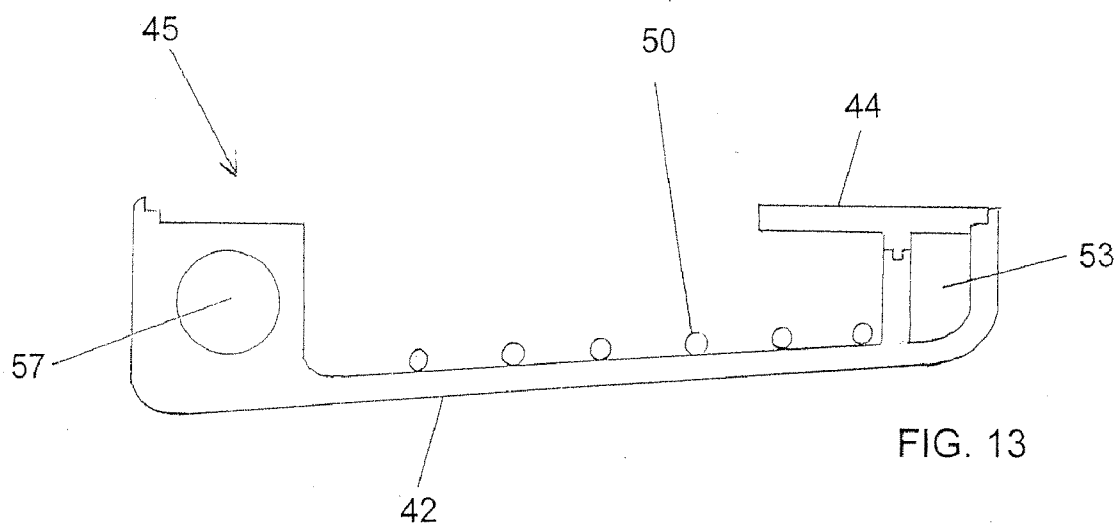
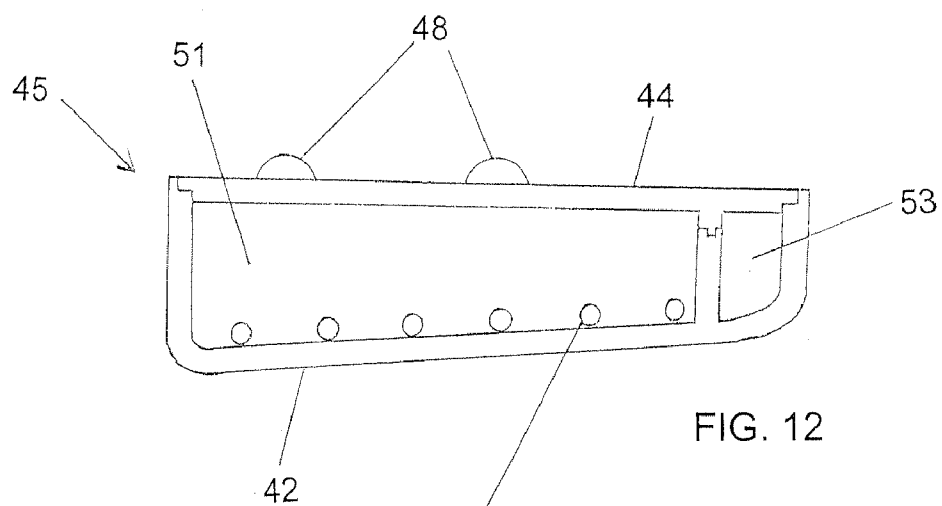


FIG. 11



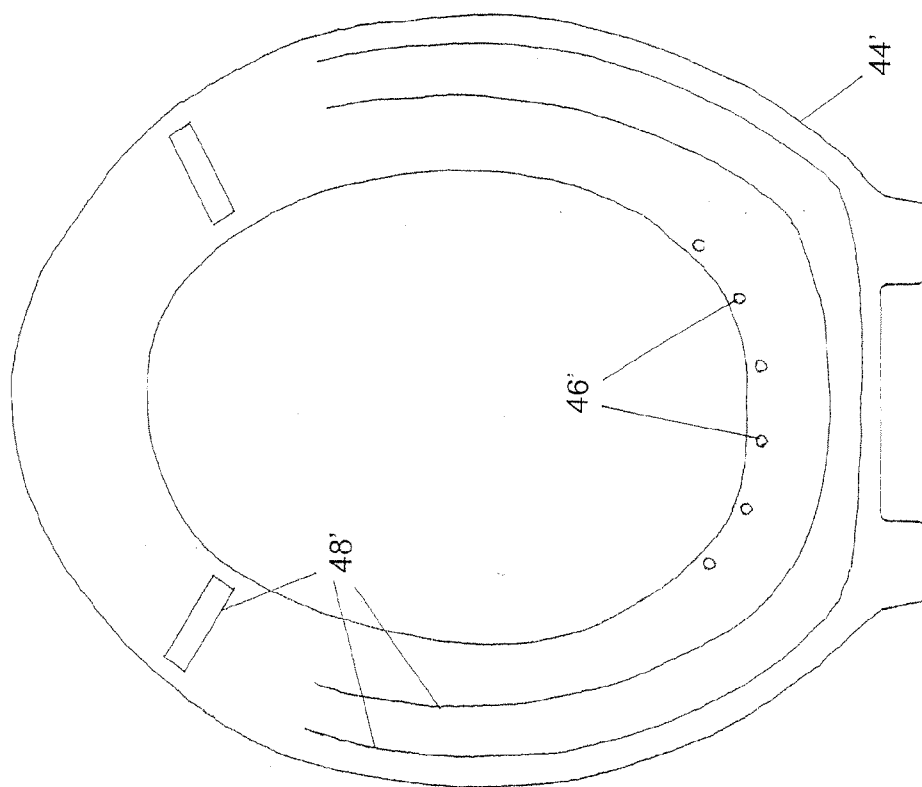


FIG. 14B

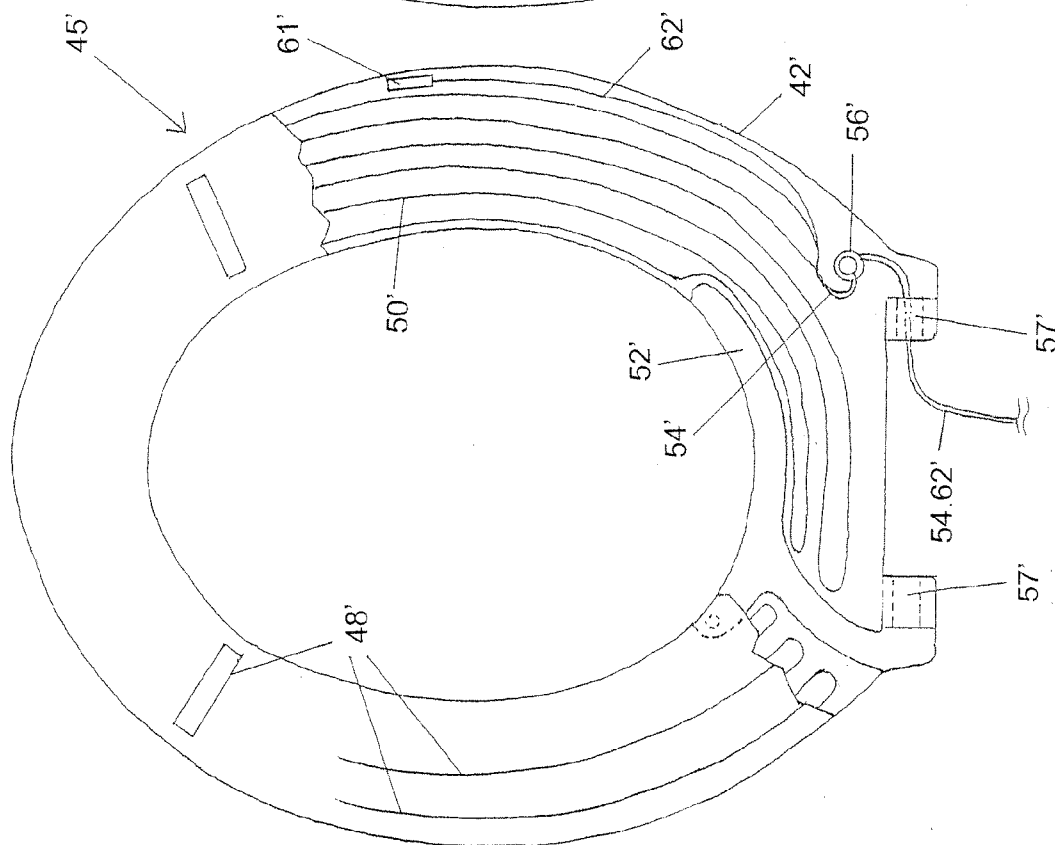


FIG. 14A

VENTILATED TOILET APPARATUS AND DUAL FUNCTION TOILET SEAT

PRIORITY CLAIM

[0001] The applicant claims the benefit under Title 35, United States Code, 119(e) of the U.S. provisional application No. 60/816,280, filed on Jun. 23, 2006, and 60/854,674, filed on Oct. 24, 2006.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable

FIELD OF THE INVENTION

[0003] This invention relates to toilet seat body, pivots and hinges in close communication to draw foul air from the toilet bowl and discharge to a remote location by a remotely controlled suction device. In addition, the present invention is concerned with the utilization of the toilet seat body which can be warmed to several temperature settings to relieve the chilly feeling on the toilet seat during the cold season. Ultimately, the current invention discloses how to incorporate these two different functions in a single unit to provide an additional comforting feeling to the bathroom users.

BACKGROUND OF THE INVENTION

[0004] To accommodate various needs in the bathrooms, a number of bathroom accessories and products are available. One of the products designed to provide a comforting feeling to the bathroom users during the cold season is a warm seat of which upper surface can be heated by means of an electric heating coil encased within the seat body and relieve the chilly feeling from the cold seat.

[0005] The houses and buildings located in the area of cold climate are prone to have poor ventilation and the residents may frequently experience unpleasant smells in some areas, especially around the bathroom. Although deodorants or air freshners are typically applied to deal with foul odors generated in the bathroom, they just simply mask the foul odors but do not eliminate them.

[0006] Alternatively, foul odors from the bathroom are evacuated by electric fans installed on the ceiling or wall of the bathroom. This type of ventilation method needs to evacuate a large volume of air, so the lingering unpleasant smell may persist until the bathroom is completely filled up with fresh air. Since the dispersion of gases from the toilet bowl to the surrounding atmosphere is the main cause of unpleasant smells in the bathroom, removal of gases directly from the toilet bowl prior to the diffusion of gases to the surrounding area has been suggested as a more efficient method to eliminate foul odors from the bathroom than the conventional ventilation system employing electric fans on the ceiling.

[0007] A numerous toilet ventilating apparatus have been described in the prior arts in an effort to remove foul bathroom odors at their source, from the toilet bowl: U.S. Pat. No. 2,072,780 (F. L. Turner, 1937), U.S. Pat. No. 3,733,619 (F. D. Smith, 1973), U.S. Pat. No. 3,916,459 (M. Ivancevic, 1975), U.S. Pat. No. 4,007,498 (R. H. Pearson, 1977), U.S. Pat. No. 4,085,470 (G. Roberts, 1978), U.S. Pat. No. 4,117,559 (D. D. Boyle, 1978), U.S. Pat. No. 4,365,361 (G. H. Sanstrom, 1982), U.S. Pat. No. 4,556,999 (J. E. Lindley, 1985), U.S. Pat. No. 4,617,687 (J. A. Wadsworth,

1986), U.S. Pat. No. 4,701,966 (C. L. Schafer, 1987), U.S. Pat. No. 4,726,078 (R. A. Carballo, et al., 1988), U.S. Pat. No. 4,893,359 (P. N. Vu, et al., 1990), U.S. Pat. No. 5,345,617 (J. F. Jahner, et al., 1994), U.S. Pat. No. 5,355,536 (A. Prisco, 1994), U.S. Pat. No. 5,539,937 (R. E. Barefoot, 1996), U.S. Pat. No. 6,237,163 (J. Gusso, et al., 2001), U.S. Pat. No. 6,260,215 (M. Miller, 2001), U.S. Pat. No. 6,523,184 (A. Prisco, 2003), U.S. Pat. No. 6,553,581 (D. Lee, 2003), U.S. Pat. No. 6,775,853 (A. Szekey, 2004), U.S. Pat. No. 6,298,500 (J. L. Sollami, 2001), U.S. Pat. No. 6,772,449 (J. P. Wolfe, 2004), but most of these methods have not been accepted in the market because of their complex and unsightly applications or susceptibility to contamination.

[0008] Many toilet seats disclosed in the previous art are to be assembled by attaching at least two separate pieces to form internal air passageways, which results in a large area of seams or unsightly apertures. Toilet seats constructed in this manner not only need a frequent cleaning to remove contamination problems, but also the structural integrity are prone to be compromised to lead a potential leakage of air flow communication. Currently, toilet seats which can provide warmth to the toilet users and relieve discomforting feeling from the cold toilet seat are commercially available. Various methods of making heated toilet seats are disclosed in the following U.S. patents: U.S. Pat. No. 4,123,807 (T. Oguma, et al., 1978), U.S. Pat. No. 4,422,190 (C. Huang, 1983), U.S. Pat. No. 4,446,584 (K. Suzuki, et al., 1984), U.S. Pat. No. 4,798,936 (A. K. Johnson, Sr., 1989), U.S. Pat. No. 4,850,060 (C. M. Kou, 1989), U.S. Pat. No. 5,095,555 (Y. Torii, et al., 1992), U.S. Pat. No. 5,586,214 (C. M. Eckman, 1996), U.S. Pat. No. 5,898,952 (M. D. Hickey, 1999), U.S. Pat. No. 5,940,895 (D. S. Wilson, et al., 1999), U.S. Pat. No. 6,307,180 (T. V. Arx, et al., 2001).

[0009] However, none of the prior arts teaches or suggests a dual function toilet seat body or an apparatus in one unit that enables a ventilation of gases from the toilet bowl to the outside atmosphere and also provides means to raise the temperature of the seat body as needed. These dual function capability in a single unit would provide the bathroom users maximum comfort and enjoyment.

BRIEF SUMMARY OF THE INVENTION

[0010] The general purpose of the present invention is to provide an apparatus which will draw foul odors from the toilet bowl and expel to a remote area, or pass the contaminated air through a filter and recirculate the purified air in the bathroom.

[0011] It is a further object of the present invention to provide an apparatus which eliminates cold toilet seat discomfort by allowing users adjust the seat's temperature. This feature will provide bathroom users an added comforting feeling.

[0012] It is a further object of the present invention to provide a toilet seat with dual functions in one body seat unit: the first function to draw foul odors from the toilet bowl and expel to the outside atmosphere by means of a proper suction device, and the second function to raise the temperature of the seat body. These two functions may be engaged simultaneously or only one of the functions may be selected by users as needed.

[0013] It is a further object of the present invention to provide an apparatus of which the outside figure is similar to a conventional toilet seat, therefore has a pleasing aesthetic appearance.

[0014] It is a further object of the present invention to provide an apparatus which will be easily retrofitting a variety of existing toilets.

[0015] It is a further object of the present invention to provide a durable ventilated toilet apparatus that can be manufactured economically and is easy to sanitize.

[0016] In order to achieve the above objects, the present invention provides a ventilated toilet apparatus that includes a toilet seat assembly that comprises a seat body that comprises an upper surface, which is adapted to contact the body of a user, and a lower surface which is adapted to be positioned adjacent to a toilet bowl, a hinge assembly; and a pivot device with which the toilet seat assembly is pivotally attached to the hinge assembly. The toilet seat assembly further comprises a pivot receiving part that is formed in the seat body, and a plurality of intake apertures that are provided on the lower surface.

[0017] The ventilated toilet apparatus further comprises an exhaust conduit provided in the pivot receiving part, and a cleaning port that is provided below the exhaust conduit and communicates with the exhaust conduit, and a plurality of air passageways that connects the intake apertures and the exhaust conduit. The pivot receiving part encloses the pivot device.

[0018] The ventilated toilet apparatus further comprises a cleaning port cap that seals the cleaning port airtight.

[0019] The intake apertures are substantially vertical to the lower surface, and the air passageways are substantially parallel to the lower surface.

[0020] The exhaust conduit comprises a junction to which the air passageways are connected, a tubular opening that is connected to the junction. The tubular opening receives the pivot device.

[0021] The pivot device comprises a hollow pivot tube.

[0022] The pivot tube is made of copper, copper alloy, polymeric resin or plastics.

[0023] The pivot tube is fixed in the tubular opening of the exhaust conduit.

[0024] The junction comprises a junction opening that is open rearward of the toilet seat assembly, and a junction cap that seals the junction opening airtight.

[0025] The exhaust conduit comprises a junction, to which the air passageways are connected, two tubular openings that are connected to the junction. The tubular openings receive the pivot device.

[0026] The pivot tube comprises a hollow pivot tube and a plurality of pivot apertures. The pivot apertures are provided in the middle section of the pivot tube. The pivot tube is fixed in the tubular openings of the exhaust conduit.

[0027] The seat body comprises a bumper that is provided on the lower surface and is adapted to contact the toilet bowl. The bumper surrounds the intake apertures.

[0028] The hinge assembly comprises a hollow hinge case, a receptive opening that receives the pivot device, and an axial post that is adapted to fix the hinge assembly to the toilet bowl.

[0029] The pivot device is rotatably received in the receptive opening. The hinge assembly further comprises an O-ring that is provided in a groove formed in the receptive opening.

[0030] The axial post comprises a hollow hinge tube.

[0031] The hinge tube is threaded whereby the hinge assembly is fixed to the toilet tube by fastening a nut with the tube.

[0032] The axial post further comprises an O-ring provided between the hinge tube and the hinge case.

[0033] The ventilated toilet apparatus further comprises a suction device that is connected to the hinge assembly. The suction device sucks air through the hinge assembly.

[0034] The ventilated toilet apparatus further comprises a heating unit with which the seat body is heated, an air passageway that connects the intake apertures and the pivot device. The seat body comprises a hollow space between the upper surface and the lower surface.

[0035] The heating unit comprises a resistive wire that is attached below the upper surface in the hollow space, an electrical cord that connects the resistive wire to a control device, a sensor that reads the temperature of the seat body, and a sensor cord that connects the sensor to the control device. The control device receives information from the sensor and controls the amount of electricity flowing to the resistive wire.

[0036] The ventilated toilet apparatus further comprises a cord fastener that secures the electrical cord and the sensor cord within the hollow space of the seat body, and a grommet that secures the electrical cord and the sensor cord within the hinge assembly.

[0037] The seat body comprises two tubular openings that receives the pivot device, and at least one bumper that is provided on the bottom surface and is adapted to contact the toilet bowl. The bumper surrounds the intake apertures.

[0038] The present invention is explained again based on individual components. A ventilated toilet apparatus includes a ventilated toilet seat assembly, a pivot and at least on hinge assemblies disposed in communication with remotely controlled suction device to withdraw foul air from the interior of the toilet bowl into the intake apertures, through air passageways, junction, pivot, hinge assembly, and suction device to the outside atmosphere. The ventilated toilet apparatus is used as a single unit or multiunits where a number of units is connected to a single suction device. The ventilated toilet apparatus being used in conventional toilets, buses, recreational vehicles, trains, movable toilets. The ventilated toilet apparatus may be used in combination with a bidet.

[0039] A ventilated toilet seat includes a plurality of intake apertures at the bottom of the toilet seat, an exhaust conduit constructed at the rear end of the toilet seat, an exhaust conduit including a junction, a junction cap, tubular openings and a cleaning port, a plurality of air passageways connecting the intake apertures and the junction, at least one bumper around intake apertures, a pivot secured at tubular openings to form a ventilated toilet seat assembly which communicate with air suction device for removal of foul air in the toilet bowl, and a cleaning port which can be opened for extraction of liquid during sanitization of the toilet seat.

[0040] A hollow tube includes a plurality of apertures in the middle section to form a pivot. The pivot is made of copper, other metals, composite material, polymeric resin or plastics. The pivot is fixed in the tubular opening of the ventilated toilet seat.

[0041] A hinge assembly includes a receptive opening including an inside groove to house an O-ring for an air tight seal with the pivot when a suction device is operating, an axial post, a hollow threaded tube, a washer and a nut to fasten the hinge assembly to the toilet bowl through the axial post, a ventilated toilet seat assembly with a pivot secured through the receptive opening so as to permit a pivotal

movement of the toilet seat assembly and air flow communication between the toilet bowl and the suction device.

[0042] At least one of the hollow threaded tubes is connected to a remotely controlled suction device.

[0043] It is an advantage of the present invention that the toilet seat assembly does not have any prominent unsightly apertures, seams, or gaskets, which have been used in most of the prior art. In the present invention, special care was taken to minimize the number of apertures and area of seam in the toilet seat and hinge assembly so that the chance of contamination is significantly reduced.

[0044] Although the present invention is briefly summarized, the fuller understanding of the invention can be obtained by the following drawings, detailed description and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0045] These and other features, aspects and advantages of the present invention will become better understood with reference to the accompanying drawings, wherein:

[0046] FIG. 1 is a perspective view of a ventilated toilet seat assembly, a hinge assembly and a suction device constructed in accordance with a first embodiment of the present invention;

[0047] FIG. 2a is a bottom view of the unfinished ventilated toilet seat and a junction cap, both formed by injection molding;

[0048] FIG. 2b is a rear elevation view of the unfinished ventilated toilet seat formed by injection molding;

[0049] FIG. 3a is a bottom view of the ventilated toilet seat with air passageways being built;

[0050] FIG. 3b is a rear elevation view of the ventilated toilet seat with air passageways being built;

[0051] FIG. 4 is a cross sectional view of the ventilated toilet seat sitting on a toilet bowl, taken along line 4-4 of FIG. 3a;

[0052] FIG. 5 is an elevation view of a pivot;

[0053] FIG. 6a is a top view of the hinge assembly;

[0054] FIG. 6b is a cross sectional view of the hinge assembly, taken along line 6b-6b of FIG. 6a;

[0055] FIG. 6c is a rear elevation view of the hinge assembly;

[0056] FIG. 7 is a perspective view of a hinge having the same outside mirror image configuration as the hinge assembly of FIG. 6;

[0057] FIG. 8 is a perspective view of the ventilated toilet seat assembled with the pivot and hinges, with some parts and bumpers deleted for clarity of illustration;

[0058] FIG. 9a is a bottom view of a ventilated toilet seat of a second embodiment;

[0059] FIG. 9b is a rear elevation view of the ventilated toilet seat; and

[0060] FIG. 9c is an elevation view of a pivot;

[0061] FIG. 10 shows a bottom view of a dual function seat body illustrated with a portion cut away, pivots, and hinge assemblies. The schematic arrangement of the dual function toilet seat assembly relative to the hinge assemblies, the suction device, and control device is also shown in FIG. 10;

[0062] FIG. 11 is a bottom view of a bottom portion of the dual function seat body;

[0063] FIG. 12 is a cross sectional view of the dual function seat body, taken along line 12-12 of FIG. 10;

[0064] FIG. 13 is a cross sectional view of the dual function seat body, taken along line 13-13 of FIG. 10;

[0065] FIG. 14a shows a bottom view of a dual function seat body of a second embodiment illustrated with a portion cut away;

[0066] FIG. 14b is a bottom view of a bottom portion of the dual function seat body of a second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0067] FIG. 1 illustrates that a toilet seat assembly 1 and a hinge assembly 3 on a toilet bowl 2 are disposed in communication with a remotely controlled suction device 4 to withdraw foul air from the interior of the toilet bowl 2 and expel to the outside atmosphere.

[0068] FIG. 2a shows that the toilet seat assembly 1 includes internally-formed intake apertures 5 and an exhaust conduit 6 and a cleaning port 7. The intake apertures 5 are arranged adjacent the rear bottom of toilet seat assembly 1.

[0069] The inner edge of the toilet seat assembly 1 near the intake apertures 5 is molded pointing downward as depicted in FIG. 4. This configuration is advantageous in protecting the intake apertures 5 from spilling or splashing during the use of toilet as well as providing a better aesthetic view.

[0070] Referring back to FIG. 2a, the exhaust conduit 6 is a hollow opening formed at the rear end of toilet seat assembly 1. The exhaust conduit 6 includes a junction 8, a junction cap 9, and tubular openings 10 which are molded to the rear edge of the toilet seat assembly 1.

[0071] FIGS. 3a and 3b show that air passageways 11 are built to connect the intake apertures 5 and the junction 8 so that movement of air is possible between them when an appropriate suction is applied. The tubular openings 10 house a pivot 14 (see FIG. 5), which mediates air flow communication between the junction 8 and the hinge assembly 3.

[0072] Once the construction of internal air passageways 11 is finished and the pivot 14 is fixed inside the tubular openings 10, the junction cap 9 is attached to a junction opening 32 to provide air tight seal.

[0073] FIG. 4 shows that the cleaning port 7 at the rear bottom edge of the toilet seat assembly 1 is provided with a cleaning port cap 13 which can be easily installed or removed. At upright position of the toilet seat assembly 1, the cleaning port 7 can be fitted to a wet vacuum or an aspirator (or conveniently a nasal suction ball) so that liquid can be collected and captured during sanitization of the intake apertures 5.

[0074] FIGS. 2a and 2b illustrate the unfinished toilet seat assembly 1, in which a number of the intake apertures 5, the junction 8 and the junction cap 9, the tubular openings 10, and the cleaning port 7 are formed advantageously by injection molding.

[0075] The toilet seat assembly 1 is initially manufactured by injection molding. Then the internal air passageways 11 are drilled through the junction 8. In this way, the present invention provides the ventilated toilet seat assembly 1 being built virtually as a one-unit, which allows the structural robustness of toilet seat. Because the relatively small area of seam around the junction cap 9 is located at the rear end of the toilet seat assembly 1, users usually do not notice any unsightly difference of the ventilated toilet seat assembly 1 of this invention from the conventional toilet seats.

[0076] Bumpers 12 surrounding the intake apertures 5 are provided to maintain a close contact to the toilet bowl 2 to prevent any leakage of the foul air from the toilet bowl 2, so that the air flows from the anterior of the toilet bowl 2 to the intake apertures 5.

[0077] The pivot 14 is an about 6 inch-long hollow tube having a plurality of apertures 34 (about $\frac{7}{32}$ " to $\frac{1}{4}$ " diameter) in the middle section as depicted in FIG. 5. The pivot 14 may be manufactured using a commercially available copper tube (L type 0.500" OD $\times$ 0.430" ID $\times$ 0.035" Wall thickness) by simple cutting of the tube to the desired length and drilling of the apertures 34.

[0078] The pivot 14 is of about the same size as the tubular openings 10 and is to be fixed therein by sliding the pivot 14 through the tubular openings 10. The pivot 14 provides a means to secure the toilet seat assembly 1 to the toilet bowl 2 through the hinge assembly 3 and also establishes an air flow communication between the junction 8 and the hinge assembly 3.

[0079] A toilet seat cover 36 (refer to FIG. 1) can be assembled to the pivot 14 allowing both the toilet seat assembly 1 and the seat cover 36 a pivotal movement.

[0080] Both ends of the pivot 14 can be secured to the hinge assembly 3 for an air flow communication. Alternatively, one end of the pivot 14 can be capped or blocked if a user does not want to use both side of the pivot 14 for the air flow communication. It is desired that the pivot 14 is structurally robust, anti-corrosive, and less prone to contamination. In respect of these desired characters, the copper tube is a preferred raw material for manufacturing of the pivot 14, but other metallic, composite, or plastic material can be used to make the pivot 14 too.

[0081] FIGS. 6a-6c show how the hinge assembly 3 secures the toilet seat assembly 1 to the toilet bowl 2. The hinge assembly 3 includes a receptive opening 15, hinge cap 16 and an axial post 17. The receptive opening 15 receives the pivot 14 horizontally to provide airtight seal and also allows pivotal movement of the toilet seat assembly 1. The axial post 17 includes a threaded hollow tube 18 and a washer 19, which provide means to mount the hinge assembly 3 in an airtight manner to the toilet bowl 2 using a matching nut. The threaded hollow tube 18 is connected to the remotely controlled suction device 4 through an appropriate hose 38. Once the hinge assembly 3 is assembled to the toilet seat assembly 1 and fastened to the toilet bowl 2, the hinge cap 16 is placed to allow an airtight seal to the hinge assembly 3. The hollow space in the hinge assembly 3 between the receptive opening 15 and the axial post 17 allows free air flow. Ultimately, the hinge assembly 3 plays a role to permit an air flow communication between the pivot 14 and the suction device 4.

[0082] The receptive opening 15 has a groove 20, which can house an o-ring or a washer 21 to provide an airtight seal with the pivot 14 when the suction device 4 is operating.

[0083] Preferably, a pair of the hinge assemblies 3 including a mirror image of FIGS. 6a-6c are connected to the suction device 4 for an air flow communication. However, only one of the hinge assembly 3 can be conveniently disposed with the suction device 4. In this case, a second hinge 22 (see FIG. 7) having the same outside mirror image configuration as the one on the opposite side can be installed.

[0084] FIG. 8 shows a perspective view of the toilet seat assembly 1, the pivot 14, the hinge assembly 3, and a second

hinge 22 which are closely related to mediate an air flow communication between the toilet bowl 2 and the suction device 4.

[0085] As seen in FIG. 8, one side of the hinges can be utilized for an air flow communication between the pivot 14 and the suction device 4 through the hose 38 (see FIG. 1), and a second hinge 22 having the same outside mirror image as the hinge assembly 3 but otherwise similar to a conventional hinge is installed at the opposite side to mount the toilet seat assembly 1 to the toilet bowl 2.

[0086] Though the bumpers 12 and some parts are deleted in FIG. 8 for the clarity of illustration, it is still obvious to the skilled in the art that the ventilating toilet apparatus described in this invention does not have any prominent difference from the conventional toilet seat, which is one of the important factors to be well accepted by the users in the market.

[0087] FIGS. 9a and 9b illustrate an alternative toilet seat assembly 40 having the same features as described in FIG. 3 except that there is only one tubular opening 10 capable of conveying an air flow communication between the junction 8 and the hinge assembly 3 mediated by the aid of a pivot 23 tightly fixed in the tubular opening 10. A hinge opening 24 is prepared to secure the toilet seat assembly 40 to the toilet bowl 2 through the second hinge 22. As depicted in FIG. 9c, the pivot 23 is a hollow tube of the same size as the tubular opening 10. The toilet seat assembly 40 including the components illustrated in FIGS. 9a-9c can be advantageously manufactured at the reduced cost compared to that of the toilet seat assembly 1 constructed using the toilet seat illustrated in FIG. 3 and the pivot 14.

[0088] FIG. 10 shows a dual function toilet seat assembly which is arranged with the hinge assemblies 3 and 30, the suction device 4, the control device 60. The dual function toilet seat assembly includes a dual function seat body 45 and pivots 23 with which the toilet seat assembly is pivotally attached to the hinge assemblies. The dual function seat body further includes a heating unit except for a control device 60, tubular openings 57, a plurality of intake apertures 46, and an air passageway 52.

[0089] The dual function seat body 45 is comprised of a top portion 42 and a bottom portion 44. The top portion 42 has an open air passageway 52, a cord fastener 56, and two tubular openings 57. As shown in FIG. 11, a plurality of intake apertures 46 are formed in the rear rim of the bottom portion 44. Bumpers 48 are provided on the bottom portion 44 and are adapted to contact the toilet bowl 2. The bumpers 48 surround the intake apertures 46. The top portion 42 and the bottom portion 44 are attached together to form a dual function seat body 45, and the seat body has a hollow space 51 and an air passageway 53. The hollow space 51 is utilized to accommodate resistive wires 50, a sensor 61. At the rear end of the top portion are formed two tubular openings 57 which accept a pivot 23.

[0090] Attachment of the top and bottom portion in air and water tight manner constructs an air passageway 53 which allows an air flow communication between the intake apertures 46 and a pivot 23 housed in one of the tubular openings 57. The other pivot 23 in the tubular opening on the opposite side is utilized as a passage of electrical cords 54 and a sensor cord 62 which extend to the control device 60. The top and bottom portions are attached together by any conventional technique.

[0091] The heating unit includes resistive wires 50, electrical cords 54, a sensor 61, a sensor cord 62, and a control device 60.

[0092] The resistive wires 50 are hermetically encapsulated and are electrically insulated within a thermally-conductive polymeric coating. The resistive wires use electricity to provide warmth, and are laid in the hollow space 51 of the dual function seat body 45, preferably close to the horizontal part of the top portion 42 in order to distribute the heat efficiently to the upper surface of the dual function seat body 45. Thermoconductive- and heat resisting polymeric resin or adhesive may be used to hold the resistive wires 50 and sensor 61 in the hollow space.

[0093] The electrical cords 54 connect the resistive wires 50 to the control device 60.

[0094] The sensor 61 reads the actual temperature of the dual function toilet seat and the sensor cord 62 relays this information to the control device 60. The electrical cords 54 and sensor cord 62 are secured within the hollow space of the seat body by the cord fastener 56. The middle section of the electrical cords and sensor cord, from which conductors extend to the control device 60, is tightly fastened by a grommet 58 in the hollow space of the hinge assembly 3. The slack portion of cords between the cord fastener and the grommet reduces a fatigue on the cords when the seat body is pivotably raised or lowered relative to the hinge assemblies 3 and 30 which was mounted on the toilet bowl 2. The hinge assembly 30 is a mirror image of the hinge assembly 3 (see FIG. 8).

[0095] The control device 60 is connected by the electrical cords 54 to the resistive wires 50 for controlling the resistive wires, and is also connected by the sensor cord 62 to a sensor 61. The control device receives information from the sensor and controls the amount of electricity flowing to the resistive wires.

[0096] The dual function seat body 45, a pivot 23, and a hinge assembly 30 are disposed in communication with a suction device 4 to move foul air from the interior of the toilet bowl 2 into the intake apertures 46, through an air passageways 53, a pivot 23, a hinge assembly 30, a hose 38 and a suction device 4. In addition to ventilation, this dual function seat body 45 can be heated by resistive wires 50 which are evenly distributed across the surface of the top portion. Therefore, the dual function toilet apparatus described in this invention can be used in combination for toilet bowl ventilation and toilet seat heating, or used separately for each of the dual functions as needed.

[0097] As depicted in FIG. 12, the top and bottom portions were attached in air- and water-tight manner to ensure the hollow space 51 and air passageway 53 are protected from potential leakage. To distribute heat efficiently to the upper surface of the dual function seat body 45, resistive wires 50 are evenly spread to cover the horizontal part of the upper portion. Thermostable polymeric resin or adhesive may be used to keep the resistive wires 50 in contact with the horizontal part of the top portion as well as to seal the contact area of top and bottom portion.

[0098] The cross section at the rear end of the dual function seat body shows the tubular opening 57 which is preferably formed during the injection molding of the top portion (see FIG. 13). The tubular opening receives a pivot 23 horizontally to provide airtight seal, and the pivot fixed in the tubular opening 57 allows a pivotal movement of the dual function seat body 45.

[0099] FIGS. 14a and 14b illustrate the bottom view of an alternative dual function seat body. The dual function seat body 45' is comprised of a top portion 42' and a bottom portion 44'. The top portion 42' has an open air passageway 52', a cord fastener 56', and two tubular openings 57'. As shown in FIG. 14b, a plurality of intake apertures 46' are formed in the rear rim of the bottom portion 44'. Bumpers 48' are provided on the bottom portion 44' and are adapted to contact the toilet bowl 2. The bumpers 48' surround the intake apertures 46'. The top portion 42' and the bottom portion 44' are attached together to form a dual function seat body 45'.

[0100] The resistive wires 50' are hermetically encapsulated and are electrically insulated within a thermally-conductive polymeric coating. The resistive wires use electricity to provide warmth, and are laid in the hollow space of the dual function seat body 45', preferably close to the horizontal part of the top portion 42' in order to distribute the heat efficiently to the upper surface of the dual function seat body 45'. Thermoconductive- and heat resisting polymeric resin or adhesive may be used to hold the resistive wires 50' and sensor 61' in the hollow space.

[0101] The electrical cords 54' connect the resistive wires 50' to the control device 60.

[0102] The sensor 61' reads the actual temperature of the dual function toilet seat and the sensor cord 62' relays this information to the control device 60. The electrical cords 54' and sensor cord 62' are secured within the hollow space of the seat body by the cord fastener 56'.

[0103] The dual function seat body 45', a pivot 23, and a hinge assembly 30 can be disposed in communication with a suction device 4 to move foul air from the interior of the toilet bowl 2 into the intake apertures 46', through an air passageways 52', a pivot 23, a hinge assembly 30, a hose 38 and a suction device 4. In addition to ventilation, this dual function seat body 45' can be heated by resistive wires 50'. Although the shape of the seat body shown in FIG. 14 is different from the shape of the seat body shown in FIG. 10, each component of the alternative dual function seat body is designed to function the same way as the components described in FIG. 10 do.

[0104] While the invention has been shown and described with reference to different embodiments thereof, it will be appreciated by those skilled in the art that variations in form, detail, compositions and operation may be made without departing from the spirit and scope of the invention as defined by the accompanying claims. For example, the toilet seats are usually provided in two different shapes, horseshoe or U-shaped type and oval or closed type. Although only oval type toilet seat was used to describe several novel features presented in the current invention, the same features of the present invention can be applied to a horseshoe type.

1. A ventilated toilet apparatus comprising:

- a) a toilet seat assembly that comprises a seat body that comprises an upper surface, which is adapted to contact the body of a user, and a lower surface which is adapted to be positioned adjacent to a toilet bowl;
- b) a hinge assembly; and
- c) a pivot device with which the toilet seat assembly is pivotally attached to the hinge assembly;

wherein the toilet seat assembly further comprises a pivot receiving part that is formed in the seat body, and a plurality of intake apertures that are provided on the lower surface.

2. The ventilated toilet apparatus of claim 1, further comprising an exhaust conduit provided in the pivot receiving part, and a cleaning port that is provided below the exhaust conduit and communicates with the exhaust conduit, and a plurality of air passageways that connects the intake apertures and the exhaust conduit, wherein the pivot receiving part encloses the pivot device.

3. The ventilated toilet apparatus of claim 2, further comprising a cleaning port cap that seals the cleaning port airtight.

4. The ventilated toilet apparatus of claim 2, wherein the intake apertures are substantially vertical to the lower surface, and the air passageways are substantially parallel to the lower surface.

5. The ventilated toilet apparatus of claim 2, wherein the exhaust conduit comprises a junction to which the air passageways are connected, a tubular opening that is connected to the junction, wherein the tubular opening receives the pivot device.

6. The ventilated toilet apparatus of claim 5, wherein the pivot device comprises a hollow pivot tube.

7. The ventilated toilet apparatus of claim 6, wherein the pivot tube is made of copper, copper alloy, polymeric resin or plastics.

8. The ventilated toilet apparatus of claim 6, wherein the pivot tube is fixed in the tubular opening of the exhaust conduit.

9. The ventilated toilet apparatus of claim 5, wherein the junction comprises a junction opening that is open rearward of the toilet seat assembly, and a junction cap that seals the junction opening airtight.

10. The ventilated toilet apparatus of claim 2, wherein the exhaust conduit comprises a junction, to which the air passageways are connected, two tubular openings that are connected to the junction, wherein the tubular openings receive the pivot device.

11. The ventilated toilet apparatus of claim 10, wherein the pivot tube comprises a hollow pivot tube and a plurality of pivot apertures, wherein the pivot apertures are provided in the middle section of the pivot tube, wherein the pivot tube is fixed in the tubular openings of the exhaust conduit.

12. The ventilated toilet apparatus of claim 2, wherein the seat body comprises a bumper that is provided on the lower surface and is adapted to contact the toilet bowl, wherein the bumper surrounds the intake apertures.

13. The ventilated toilet apparatus of claim 2, wherein the hinge assembly comprises a hollow hinge case, a receptive

opening that receives the pivot device, and an axial post that is adapted to fix the hinge assembly to the toilet bowl.

14. The ventilated toilet apparatus of claim 13, wherein the pivot device is rotatably received in the receptive opening, wherein the hinge assembly further comprises an O-ring that is provided in a groove formed in the receptive opening.

15. The ventilated toilet apparatus of claim 13, wherein the axial post comprises a hollow hinge tube.

16. The ventilated toilet apparatus of claim 15, wherein the hinge tube is threaded whereby the hinge assembly is fixed to the toilet tube by fastening a nut with the tube.

17. The ventilated toilet apparatus of claim 16, wherein the axial post further comprises an O-ring provided between the hinge tube and the hinge case.

18. The ventilated toilet apparatus of claim 2, further comprising a suction device that is connected to the hinge assembly, wherein the suction device sucks air through the hinge assembly.

19. The ventilated toilet apparatus of claim 1, further comprising a heating unit with which the seat body is heated, an air passageway that connects the intake apertures and the pivot device, wherein the seat body comprises a hollow space between the upper surface and the lower surface.

20. The ventilated toilet apparatus of claim 19, wherein the heating unit comprises a resistive wire that is attached below the upper surface in the hollow space, an electrical cord that connects the resistive wire to a control device, a sensor that reads the temperature of the seat body, and a sensor cord that connects the sensor to the control device, wherein the control device receives information from the sensor and controls the amount of electricity flowing to the resistive wire.

21. The ventilated toilet apparatus of claim 20, further comprising a cord fastener that secures the electrical cord and the sensor cord within the hollow space of the seat body, and a grommet that secures the electrical cord and the sensor cord within the hinge assembly.

22. The ventilated toilet apparatus of claim 19, wherein the seat body comprises two tubular openings that receives the pivot device, and at least one bumper that is provided on the bottom surface and is adapted to contact the toilet bowl, wherein the bumper surrounds the intake apertures.

23. The ventilated toilet apparatus of claim 19, further comprising a suction device that is connected to the hinge assembly, wherein the suction device sucks air through the hinge assembly.

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