TOILET BOWL ODOR REMOVING DEVICE AND METHOD THEREFOR

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ABSTRACT
A toilet bowl odor removing device and method therefor capable of being coupled to a toilet and capable of effectively collecting air proximate the toilet bowl, thereby preventing the escape of toilet bowl odor into the surrounding environment, and thereafter filtering the collected air, isolating odor causing agents, and then releasing the collected air back into the environment.
FIELD OF THE INVENTION

[0001] This invention relates generally to odor removal and, more specifically, to a toilet bowl odor removing device and method thereof capable of being attached to a toilet bowl and capable of substantially eliminating toilet bowl odor using a filter in combination with a humidifying chamber.

BACKGROUND OF THE INVENTION

[0002] Everyone is familiar with the unpleasant odors often associated with the toilet. Accordingly, several different methods exist for addressing this problem. Unfortunately, many of the commonly accepted methods do nothing to remove the odor causing agents from the environment, and oftentimes merely mask the unpleasant odors.

[0003] This invention addresses this problem by providing a device capable of collecting and filtering air containing toilet bowl odor that is compatible with the majority of toilets and that removes the majority of the unpleasant odors before they have a chance to permeate the air of the surrounding environment.

[0004] Furthermore, many prior inventions that have been designed to address toilet bowl odors have used a complex toilet seat to act as an inlet for collection of air. Unfortunately the complexity of the air-collecting toilet seat drives up the cost of the device.

[0005] This invention addresses this problem of increased expense by providing a simple air collector that is easily installed beneath an existing toilet seat, which draws air from the direction of the bottom of the bowl, while leaving use of the toilet unobstructed.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide a toilet bowl odor removing device having the ability to be easily attached to a toilet and to remove toilet bowl odor from the proximity of the toilet bowl and to return the collected air to the surrounding environment following the isolation of the odor causing agents within the collected air by using a filter.

[0007] It is a further object of the present invention to pass the collected air containing the toilet bowl odor through a humidifying chamber to cause the collected air to be humidified before passing the collected air through the filter, enabling the filter to remove a greater amount of the odor causing agents from the collected air at a quicker rate than if the collected air was not humidified.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] In accordance with one embodiment of the present invention, a toilet bowl odor removing device is disclosed, comprising, in combination, an air collector having an air inlet end and an air outlet end, a fan having a filter inlet and a filter outlet, the fan inlet coupled to the air outlet end of the air collector, a humidifying chamber having an air inlet and a humidified air outlet, the air inlet coupled to the air outlet of the fan, and the humidified air outlet dimensioned to drain liquid from the liquid reservoir, and a liquid outlet dimensioned to drain liquid from the liquid reservoir, and a filter having an air inlet and a humidified air inlet, the humidified air inlet coupled to the humidified air outlet of the humidifying chamber, the filter dimensioned to filter humidified air received from the humidified air inlet and to release filtered air through the air outlet of the filter.

[0009] In accordance with another embodiment of the present invention, a method for removing toilet bowl odor is disclosed, comprising, in combination, the steps of providing a commode having a tank and a seat and a bowl, providing an air collector having an air inlet end and an air outlet end, coupling the air collector proximate the bowl, providing a fan having a fan inlet and a fan outlet, coupling the fan inlet to the air outlet end of the air collector, providing a humidifying chamber having an air inlet and a liquid reservoir and a humidified air outlet, coupling the air inlet to the air outlet of the fan, the liquid reservoir comprising, a liquid inlet dimensioned to receive liquid in the liquid reservoir, and a liquid outlet dimensioned to drain liquid from the liquid reservoir, providing a filter having an air outlet and a humidified air inlet, coupling the humidified air inlet to the humidified air outlet of the humidifying chamber, the filter filtering humidified air received from the humidified air inlet, the filter releasing filtered air through the air outlet of the filter, filling the liquid reservoir with liquid, activating the fan to draw air from the air inlet end of the air collector and expel air through the air outlet of the filter.

[0010] In accordance with yet another embodiment of the present invention, a toilet bowl odor removing device is disclosed, comprising, in combination, an air collector having an air inlet end and an air outlet end, a fan having a filter inlet and a filter outlet, the fan inlet coupled to the air outlet end of the air collector, a humidifying chamber having an air inlet and a liquid reservoir and a humidified air outlet, the air inlet coupled to the air outlet end of the fan, and the liquid reservoir comprising, a liquid inlet dimensioned to receive liquid in the liquid reservoir, wherein the liquid inlet of the humidifying chamber being coupled to a liquid source capable of filling a toilet tank following activation of a flushing mechanism coupled to the toilet tank, and a liquid outlet dimensioned to drain liquid from the liquid reservoir, wherein the liquid outlet of the humidifying chamber dimensioned to drain liquid into the toilet bowl upon activation of a flushing mechanism coupled to the toilet bowl, a filter having an air outlet and a humidified air inlet, the humidified air inlet coupled to the humidified air outlet of the humidifying chamber, the filter dimensioned to filter humidified air received from the humidified air inlet and to release filtered air through the air outlet of the filter, and wherein the air outlet of the filter being at a higher elevation than the humidified air inlet of the filter, a housing dimensioned to house the fan and the humidifying chamber and the filter, the housing defining at least one exhaust port, the at least one exhaust port being coupled to the air outlet of the filter, and sound insulation proximate an interior portion of the housing.

[0011] The foregoing and other objects, features, and advantages of the invention will be more apparent from the following, more particular description of the preferred embodiments of the invention, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is an elevated perspective view of the air collector of one embodiment of the toilet bowl odor removing device of the present invention coupled to a standard toilet seat;
FIG. 2 is a cross-sectional view of the filter of one embodiment of the toilet bowl odor removing device of the present invention in which the filter comprises flow tubes arranged in a honeycomb shape;

FIG. 3 is an elevated perspective view of the filter of one embodiment of the toilet bowl odor removing device of the present invention shown with the first filter screen coupled to the air outlet;

FIG. 4 is an elevated perspective view of the opposite end of the filter of the toilet bowl odor removing device of FIG. 3, showing the second filter screen coupled to the humidified air inlet of the filter;

FIG. 5 is a side, transparent view of the humidifying chamber of one embodiment of toilet bowl odor removing device of the present invention;

FIG. 6 is a side view of various elements of one embodiment of the toilet bowl odor removing device of the present invention, namely the filter, the humidifying chamber, the fan, and the drain, all of which are shown in phantom and housed in a housing defining an inlet hole through which the air outlet end of the air collector is coupled to the fan inlet, and defining exhaust ports, represented by the smaller dashed circles, for allowing the air expelled from the air outlet of the filter to be returned to the surrounding environment;

FIG. 6A is a side, phantom view of various elements of one embodiment of the present invention, namely the filter, the humidifying chamber, the fan, and the drain, all of which are shown in phantom and housed in a housing defining an inlet hole through which the air outlet end of the air collector is coupled to the fan inlet, and also defining exhaust ports for allowing the air expelled from the air outlet of the filter to be returned to the surrounding environment;

Common reference numerals are used throughout the drawings and detailed descriptions to indicate like elements.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention will best be understood by reference to the following detailed description of illustrative embodiments when read in conjunction with the accompanying drawings, wherein like reference numerals and symbols represent like elements.

Referring to FIGS. 1, 2 and 4-6A, a preferred embodiment of a toilet bowl odor removing device, referred to generically as a toilet bowl odor removing device, is disclosed. The toilet bowl odor removing device comprises an air collector 12 (shown in FIG. 1) having an air inlet end 14 (shown in FIG. 1) positioned proximate a toilet bowl 15 (shown in FIG. 1) beneath a toilet seat 11 (shown in FIG. 1) and having an air outlet end 16 (shown in FIG. 1). The toilet bowl odor removing device further comprises a fan 20 (shown in FIGS. 5-6A) having a fan inlet 18 (shown in FIGS. 5 and 5A) and a fan outlet 22 (shown in FIGS. 5 and 5A). The air outlet end 16 of the air collector 12 is coupled to the fan inlet 18 of the fan 20. The toilet bowl odor removing device further comprises a humidifying chamber 26 (shown in FIGS. 4-6A) having an air inlet 24 (shown in FIGS. 4-6A), a liquid reservoir 28 (shown in FIGS. 4-6A) and a humidified air outlet 30 (shown in FIGS. 4-6A). The fan outlet 22 of the fan 20 is coupled to the air inlet 24 of the humidifying chamber 26. The humidifying chamber 26 also comprises a liquid inlet 32 (shown in FIGS. 4, 6, and 6A) for receiving liquid 39 (shown in FIG. 4) into the liquid reservoir 28. The humidifying chamber 26 further comprises a liquid outlet 34 (shown in FIGS. 4-5A) coupled to a drain 35 (shown in FIGS. 5-5A) for draining liquid 39 from the liquid reservoir 28. The toilet bowl odor removing device further comprises a filter 38 (shown in FIGS. 2-3a, and 5-6A) having a humidified air inlet 36 (shown in FIGS. 3, 3a, and 5-6A), an air outlet 40 (shown in FIGS. 2-3a and 5-6A) and a first filter screen 41 (shown in FIG. 3) coupled to the air outlet 40 and a second filter screen 47 (shown in FIG. 3a) coupled to the humidified air inlet 36 of the filter 38. The humidified air outlet 30 of the humidifying chamber 26 is coupled to the humidified air inlet 36 of the filter 38. It is important that the collected air 45 (shown in FIG. 4) is bubbled through the liquid 39 in the humidifying chamber 26 before reaching the filter 38 as the humidification of the collected air 45 enables the filter 38 to effectively capture the odor causing agents contained in the collected air 45, and would not be able to do so as effectively if the collected air 45 was not humidified.

While, in the preferred embodiment, the fan outlet 22 is hermetically sealed in its coupling with the air inlet 24 of the humidifying chamber 26, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the fan outlet 22 is not hermetically sealed with the air inlet 24 of the humidifying chamber 26 without departing from the scope and spirit of the invention.

Furthermore, although in the preferred embodiment the air collector 12 is installed beneath the toilet seat 11 by placing bolts through bolt holes of the toilet seat 11 and through bolt holes in the air collector 12 and into bolt holes proximate the toilet bowl 15, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the air collector 12 is installed in a different manner without departing from the scope and spirit of the invention.

Also, although in the preferred embodiment, the collected air 45 passing through the liquid reservoir 28 of the humidifying chamber 26 must make two 90-degree turns before passing through the filter 38, as to reduce the likelihood of large droplets of liquid 39 being forced into the filter 38, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the pathway in which collected air 45 travels from the liquid reservoir 28 of the humidifying chamber 26 to the filter 38 is differently designed without departing from the scope and spirit of the invention.
[0027] Referring to FIG. 2, in the preferred embodiment, the filter 38 comprises 20x50 mesh CENTAUR™ granular activated carbon arranged in flow tubes 43 between the humidified air inlet 36 (shown in FIGS. 3, 3a and 5-6A) and the air outlet 40 of the filter 38. CENTAUR™ carbon has a catalytic function, and a reduction in size of carbon granules increases the surface area of carbon within the filter 38 thereby causing the filter 38 to operate more effectively than if larger granules of carbon were used. Additionally, the use of flow tubes 43 limit the movement of the carbon granules within the filter 38. However, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the filter 38 comprises a different carbon material, or comprises a material other than carbon, or in which the material within the filter 38 is differently arranged, or in which flow tubes 43 are not used, without departing from the scope and spirit of the invention.

[0028] Furthermore, while in the preferred embodiment the first filter screen 41 and the second filter screen 47 are made of nonferrous material, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the first filter screen 41 and the second filter screen 47 are made of a material that is not nonferrous, or in which the first filter screen 41 is used without the second filter screen 47 or the second filter screen 47 is used without the first filter screen 41, or in which no filter screen 41/47 is used at all, without departing from the scope and spirit of the invention.

[0029] Further still, while in the preferred embodiment the humidified air inlet 36 of the filter 38 is at a lower elevation than the air outlet 40 of the filter 38 so as to reduce the likelihood that the carbon will become packed within the filter 38, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the filter 38 is differently oriented, without departing from the scope and spirit of the invention.

[0030] Referring to FIGS. 1, and 5-6A, in the preferred embodiment of the present invention a housing 42 (shown in FIGS. 5-6A) is used to contain the fan 20 (shown in FIGS. 5-6A), the humidifying chamber 26 (shown in FIGS. 5-6A), and the filter 38 (shown in FIGS. 5-6A) of the present invention. Additionally, and in the preferred embodiment, the air outlet end 16 (shown in FIG. 1) of the air collector 12 (shown in FIG. 1) is coupled to the fan inlet 18 (shown in FIGS. 5-6A) of the fan 20 through an inlet hole 44 (shown in FIGS. 5 and 5A) in the housing 42 to allow the fan 20 to receive the air collected by the air collector 12. Furthermore, and still in the preferred embodiment, the housing 42 will also define a plurality of exhaust ports 46 (shown in FIGS. 5-6A) to allow release of the air expelled through the filter 38 back into the surrounding environment. However, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the housing 42 is differently designed, in which only some of the depicted elements of the invention are housed by the housing, in which additional elements of the invention are housed in the housing, or in which no housing 42 is used at all, without departing from the scope and spirit of the invention.

[0031] Also in the preferred embodiment, the air outlet end 16 of the air collector 12 is hermetically sealed to the fan inlet 18 of the fan 20 to prevent the creation of a vacuumed environment within the housing 42. However, it should be clearly understood that substantial benefit could be derived from an alternative embodiment of the present invention in which the air outlet end 16 of the air collector 12 is not hermetically sealed to the fan inlet 18 of the fan 20, without departing from the scope and spirit of the invention.

[0032] In another embodiment of the present invention, the toilet bowl odor removing device further comprises a fill tube 48 (shown in FIGS. 6 and 6A) coupled to the liquid inlet 32 (shown in FIGS. 6 and 6A) of the humidifying chamber 26, enabling a user to manually fill the liquid reservoir 28 (shown in FIGS. 5-6A) of the humidifying chamber 26, while the drain 35 is similarly manually operated. In the preferred embodiment, the liquid reservoir 28 will be drained through the liquid outlet 34 (shown in FIGS. 5-6A) and through the drain 35 (shown in FIGS. 5 and 5A) into the toilet bowl 15 (shown in FIG. 1) to which the toilet bowl odor removing device is coupled. Further preferably, the liquid reservoir 28 is filled through the liquid inlet 32 by the plumbing that fills the toilet tank 17 (shown in FIG. 1) to which the toilet bowl odor removing device is coupled. It should be understood that the present invention may also be used in which the filling and draining of the liquid reservoir 28 is done manually or by other means without departing from the scope and spirit of the invention.

[0033] While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

1. A toilet bowl odor removing device comprising:
   a. an air collector having an air inlet end and an air outlet end;
   b. a fan having an air inlet and a fan outlet, said fan coupled to said air outlet end of said air collector;
   c. a humidifying chamber having an air inlet and a liquid reservoir and a humidified air outlet, said air inlet coupled to said air outlet of said fan, and said liquid reservoir comprising:
      a. a liquid inlet dimensioned to receive liquid in said liquid reservoir; and
      b. a liquid outlet dimensioned to drain liquid from said liquid reservoir; and
   d. a filter having an air inlet and a humidified air inlet, said humidified air inlet coupled to said humidified air outlet of said humidifying chamber, said filter dimensioned to filter humidified air received from said humidified air inlet and to release filtered air through said air outlet of said filter.

2. The toilet bowl odor removing device of claim 1 further comprising:
   a. a housing dimensioned to house said fan and said humidifying chamber and said filter, said housing defining at least one exhaust port, said at least one exhaust port being coupled to said air outlet of said filter.

3. The toilet bowl odor removing device of claim 2 further comprising sound insulation proximate an interior portion of said housing.

4. The toilet bowl odor removing device of claim 1 wherein said fan draws air from said air inlet end of said air collector at a velocity less than a velocity of air expelled from said air outlet of said filter.

5. The toilet bowl odor removing device of claim 1 wherein said air outlet of said filter being at a higher elevation than said humidified air inlet of said filter.
6. The toilet bowl odor removing device of claim 1 wherein said filter being a carbon filter.

7. The toilet bowl odor removing device of claim 6 wherein said carbon filter comprising granular activated carbon.

8. The toilet bowl odor removing device of claim 7 wherein said carbon filter comprising a plurality of flow tubes containing said granular activated carbon, each of said plurality of flow tubes having a first end proximate said humidified air inlet of said filter and a second end proximate said air outlet of said filter.

9. The toilet bowl odor removing device of claim 6 wherein said carbon filter comprising catalytic carbon.

10. The toilet bowl odor removing device of claim 6 wherein said carbon filter comprising CENTAUR catalytic carbon.

11. The toilet bowl odor removing device of claim 6 wherein said carbon filter comprising one of liquid activated carbon and liquid vapor activated carbon.

12. The toilet bowl odor removing device of claim 1 wherein said liquid inlet of said humidifying chamber being coupled to a liquid source capable of filling a toilet tank.

13. The toilet bowl odor removing device of claim 12 wherein said liquid inlet of said humidifying chamber dimensioned to receive liquid following activation of a flushing mechanism coupled to said toilet tank.

14. The toilet bowl odor removing device of claim 1 further comprising a filling mechanism coupled to said liquid inlet of said humidifying chamber, wherein said filling mechanism delivering liquid into said liquid reservoir when said liquid reservoir containing an amount of liquid being less than a predetermined amount.

15. The toilet bowl odor removing device of claim 1 wherein said liquid outlet of said humidifying chamber dimensioned to drain liquid into said toilet bowl.

16. The toilet bowl odor removing device of claim 16 wherein said liquid outlet of said humidifying chamber drains liquid into said toilet bowl upon activation of a flushing mechanism coupled to said toilet bowl.

17. The toilet bowl odor removing device of claim 1 further comprising a fill tube coupled to said liquid inlet of said humidifying chamber.

18. The toilet bowl odor removing device of claim 1 a first filter screen coupled to said air outlet of said filter and a second filter screen coupled to said humidified air inlet of said filter.

19. A toilet bowl odor removing device comprising: an air collector having an air inlet end and an air outlet end; a fan having a fan inlet and a fan outlet, said fan inlet coupled to said air outlet end of said air collector; a humidifying chamber having an air inlet and a liquid reservoir; and a humidified air outlet, said air inlet coupled to said air outlet of said fan, and said liquid reservoir comprising:

   a liquid inlet dimensioned to receive liquid in said liquid reservoir, wherein said liquid inlet of said humidifying chamber being coupled to a liquid source capable of filling a toilet tank following activation of a flushing mechanism coupled to said toilet tank; and a liquid outlet dimensioned to drain liquid from said liquid reservoir, wherein said liquid outlet of said humidifying chamber dimensioned to drain liquid into said toilet bowl upon activation of a flushing mechanism coupled to said toilet bowl; a filter having an air outlet and a humidified air inlet, said humidified air inlet coupled to said humidified air outlet of said humidifying chamber, said filter dimensioned to filter humidified air received from said humidified air inlet and to release filtered air through said air outlet of said filter, and wherein said air outlet of said filter being at a higher elevation than said humidified air inlet of said filter; a housing dimensioned to house said fan and said humidifying chamber and said filter, said housing defining at least one exhaust port, said at least one exhaust port being coupled to said air outlet of said filter; and sound insulation proximate an interior portion of said housing.

20. A method of removing odor from a toilet bowl comprising:

   providing a commode having a tank and a seat and a bowl; providing an air collector having an air inlet end and an air outlet end; coupling said air collector proximate said bowl; providing a fan having a fan inlet and a fan outlet; coupling said fan inlet to said air outlet end of said air collector; providing a humidifying chamber having an air inlet and a liquid reservoir and a humidified air outlet; coupling said air inlet to said air outlet of said fan, said liquid reservoir comprising:

   a liquid inlet dimensioned to receive liquid in said liquid reservoir; and a liquid outlet dimensioned to drain liquid from said liquid reservoir; providing a filter having an air outlet and a humidified air inlet; coupling said humidified air inlet to said humidified air outlet of said humidifying chamber; said filter filtering humidified air received from said humidified air inlet; said filter releasing filtered air through said air outlet of said filter; filling said liquid reservoir with liquid; and activating said fan to draw air from said air inlet end of said air collector and expel air through said air outlet of said filter.

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