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(54) **Method and system for removing odor from plumbing units.**

(57) A system for reducing odors associated with a plumbing unit comprising at least one air intake port disposed in the vicinity of the plumbing unit, air displacement means for inducing air into the at least one air intake port, and a piping system through which the air from the at least one air intake port moves to an exhaust location, characterized in that the exhaust location is in a water trap associated with the plumbing unit.

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FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to methods and systems for reducing or eliminating odors in a room, particularly those associated with bathroom toilets.

Considerable efforts have been devoted to reducing or eliminating the odors which are typically associated with toilets. One of the earliest examples of these efforts is the widespread use of a water trap in conventional modern toilets. Thus, the vast majority of toilets are currently designed so that the outlet pipe from the toilet to the sewer system first rises and then falls which ensures that a certain amount of water will always be trapped at the bottom of the toilet bowl. The standing water which constitutes the water trap prevents odors from the sewer line from entering the toilet and the bathroom.

While the widespread use of water traps is highly effective in preventing odors arising from wastes which have already been flushed into the sewer system, water traps are largely ineffective in reducing or eliminating odors which do not reach the water in the toilet bowl or which rise up from the water prior to flushing. These odors can leave the toilet and pervade the bathroom, which may inconvenience users of the bathroom.

Various attempts have been made to solve the above-described problem. In common use are various vents which are located at one or more convenient points in the bathroom and which use an air blower to move air from the bathroom and kitchen to the outside of the house. A disadvantage of this system is that it allows the odors to spread throughout the bathroom prior to venting to the outside which does little to aid an immediate user of the toilet. An additional disadvantage is that the use of a vent requires expensive installation since a passageway must be made in an exterior wall of the house and since suitable ducting, which is often unsightly or at least aesthetically displeasing, must be installed.

To partially overcome these disadvantages, systems have been proposed to provide air intake ports at or near the toilet bowl itself so as to capture the odors before they have a chance to spread throughout the bathroom. The captured odors are then exhausted to the outside of the house. While this represents an advance over the simple bathroom venting system, the problem of expensive and unsightly ducting remains.

To overcome these disadvantages, it has been proposed to exhaust the captured air into the air-filled portion of the sewer line just downstream of the water trap by tapping the sewer line and connecting thereto the exhaust air line. The difficulty with such a system is that whenever the blower is not operating, it may be possible for odors from the sewer system to enter the exhaust line and thence into the room, effectively bypassing, and reducing the effectiveness of, the water trap which is intended to eliminate precisely this situation. To overcome this disadvantage it may be necessary to equip the system with a suitable one-way valve or other shutoff means, which would add to the cost and complexity of the system and which would degrade its reliability.

There is thus a widely recognized need for, and it would be highly advantageous to have, a method and system for effectively removing toilet odors without the need for air ducting to the outside of the dwelling and without incurring the risk of introducing sewer odors into the bathroom or kitchen.

SUMMARY OF THE INVENTION

According to the present invention there is provided a system for reducing odors associated with a plumbing unit comprising (a) at least one air intake port disposed in the vicinity of the plumbing unit; (b) air displacement means for inducing air into the at least one air intake port; and (c) a piping system through which the air from the at least one air intake port moves to an exhaust location; characterized in that the exhaust location is in a water trap associated with the plumbing unit.

Also according to the present invention, there is provided a method for reducing odors associated with a plumbing unit coupled to a sewer pipe comprising collecting air containing odors from the vicinity of the plumbing unit and exhausting said air into the downstream portion of a water trap associated with the plumbing unit.

According to further features in preferred embodiments of the invention described below, the air displacement means is an air blower which is preferably external to the toilet, as is the exhaust pipe leading from the air blower to the sewer pipe.

According to still further features in the described preferred embodiments, the system further includes sound muffling means for muffling the sound of exhausted air entering the downstream portion of the water trap of the toilet.

The present invention successfully addresses the shortcomings of the presently known configurations by providing a system and method for reducing or eliminating toilet odors in a way which does not require the ducting of exhaust air to the outside of the dwelling and which ensures that no odors from the sewer system are able to enter the bathroom.

More specifically, the method and system of the present invention involves collecting air, preferably from the vicinity of the toilet, and exhausting the air into the water found in the downstream portion of the water trap commonly found in modern toilets.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of ex-

ample only, with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic side cross sectional view of a typical toilet showing portions of a system according to the present invention;

FIG. 2 is a cross-sectional back view of the downstream portion of the water trap showing one possible way in which air enters the water in the downstream portion of the water trap;

FIG. 3 is a top view of a toilet bowl seat and cover, showing one possible arrangement of air intake ports;

FIG. 4 is a side view of an alternate embodiment of the present invention;

FIG. 5 is another side view of the embodiment of Figure 4;

FIG. 6 is a side view of an alternative embodiment of the invention for use in the siphon of a sink;

Fig. 7 is a schematic sectional view of another alternate embodiment of the present invention;

Fig. 8 is a schematic sectional view of still another embodiment of the invention;

Fig. 9 is a side view of a further embodiment of the invention;

Fig. 10 is a top view of a toilet bowl according to one embodiment of the invention;

Fig. 11 is a rear view of a toilet bowl according to an alternate embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is of a method and system for removing undesirable odors, most particularly toilet odors and kitchen odors. While the method and system are applicable to any plumbing unit, i.e., sink, toilet, irrigation drain, from the area of which it is desired to remove odor-carrying air, they are described hereinbelow with regard to toilets for ease and convenience of description.

When applying the system to toilets, the system can be retrofitted onto an existing toilet but is preferably installed on new toilets by the original manufacturer. According to various embodiments, the toilet bowl can be modified to include the system of the invention as an integral part thereof, or the existing toilet bowl or fresh water feed pipe can be cut and the system of the invention screwed in place therein. The principles and operation of a system according to the present invention may be better understood with reference to the drawings and the accompanying description.

Referring now to the drawings, Figure 1 illustrates a system according to one embodiment of the present invention. Shown in Figure 1 is a typical modern toilet **10** which has been slightly modified to accommodate a system according to the present invention. Toilet **10** typically includes a base **12** which is permanently connected to the floor, a toilet bowl **14**, a toilet seat **16** and a toilet seat cover **18**. Leaving toilet **10** is a sewer pipe **20** which leads the contents of the toilet bowl **14** into the sewer system. Entering toilet **10** is a fresh water line **22** which is used for flushing.

As described briefly, modern toilets, such as the one shown in Figure 1, include a water trap. Thus, the water at the bottom of toilet bowl **14** must first rise before falling into sewer pipe **20**. The result is the presence, between flushes, of a pool of water, i.e., a water trap **24** at the bottom of toilet bowl **14**. The height of water trap **24** is typically determined by the lowest point of the upward kink in sewer pipe **20**. Typically, water trap **24** is effectively divided by a divider **26** which serves to induce better circulation during flushing.

For purposes of discussion, water trap **24** may be considered to be effectively divided into two portions -- an upstream portion and a downstream portion, based on whether gas released in water trap **24** will leave the water into toilet bowl **14** or into sewer pipe **20,** respectively. Thus, in the example of Figure 1, the upstream portion of water trap **24** is considered to be all the water located to the right (or forward) of a vertical plane touching the right-most point of divider **26**, while all the water to the left (or backward) of the vertical plane touching the right-most point of divider **26** is considered to be the downstream portion of water trap **24**.

A system according to the present invention includes at least one air intake port. Preferably, several air intake ports are used. Most preferably, at least some of the air intake ports are located on, in, or in the vicinity of toilet **10**.

Shown in Figure 3 is one of many possible arrangements of air intake ports. Featured are a pair of front intake ports **40**, a pair of intermediate ports **42** and a pair of rear ports **44** mounted on toilet seat **16**. Also shown (in broken lines) are the corresponding take-up pipes **46**, **48** and **50** which run through or immediately adjacent to toilet seat **16** and which are used to convey the collected air to the blower. Preferably, toilet seat **16** is seated on a seal (not shown) which seals any gaps which would otherwise be present between seat **16** and toilet bowl **14** and which would otherwise tend to allow air to escape from toilet bowl **14**.

An additional cover intake port **52** with its dedicated take-up pipes **54** is included at the lower portion of toilet seat cover **18** and is intended to capture any air which might escape capture by rear air intake ports **44**.

Alternatively, the air intake port can be in the toilet bowl itself, as described in detail hereinbelow.

A system according to the present invention includes suitable air displacement means for inducing air into the air intake ports and through the take-up

piping. Preferably, the air displacement means includes a suitable air blower **60**, preferably a blower which operates quietly. Preferably, air blower **60** is located outside of toilet **10** so as to avoid possible contact of the electrical components of air blower **60** with moisture associated with toilet **10**. Preferably, air blower **60** is electrically driven with energy being supplied from the household electrical system. Air blower **60** is preferably mounted either onto a suitable portion of the outside of toilet **10** or sewer pipe **20** or is mounted (as shown in Figure 1) to the wall **62** with a suitable mounting member **64**. A system according to the present invention includes a piping system through which the air collected by the various air intake ports moves to an exhaust location.

Preferably, a system according to the present invention is configured so that the take-up pipes from the various air intake ports (for example, see Figure 3) come together to form a single take-up pipe **66** which is connected to the suction side of air blower **60**. The exhaust side of air blower **60** is connected to an exhaust pipe **68** which leads the collected air to the proper exhaust location, as described below. Preferably, exhaust pipe **68** runs on the outside of toilet bowl **14**, so as not to interfere with the normal operations of toilet **10.** Exhaust pipe **68** may be clamped or otherwise attached to sewer pipe **20** or to some other suitable structure using various clamps **70** or outer mechanisms.

The system and method according to the present invention are characterized in that the exhaust location is not the outside of the dwelling or in a location from which the odors can return into the area from which they have been removed. Rather, the exhaust location is a water trap which acts as a one-way valve for passage of odors. In the embodiment illustrated in Fig. 1, the exhaust location is the downstream portion of water trap **24**, as that location was described above. Preferably, the exhaust location is at the side of the downstream portion of water trap **24** of toilet **10**, as shown in Figure 1.

The location of the exhaust in water trap **24** rather than directly in the air-filled portion of sewer pipe **20** is critical in that the presence of water around the exhaust ensures that no odors from the sewer system will be able to enter the exhaust pipe and enter the bathroom. At the same time, the release of the air in the downstream portion of water trap **24** ensures that any odors which might escape from the water will enter the air-filled sewer pipe **20** rather than the air space above water trap **24** in toilet bowl **14** from where the odors could escape into the bathroom.

In this embodiment, one result of releasing air directly into the water is that the release may be accompanied by the generation of bubbling sounds which some users might find objectionable. Another disadvantage is that bubbling might lead to the premature loss of water to the sewer line. It is thus preferable to include a suitable muffling system which will tend to reduce or eliminate the bubbling sounds in question and which will preferably also prevent the premature escape of water to the sewer. Various ways of accomplishing this may be envisioned.

One example of a sound muffling technique is shown in Figure 2 which is a cross-sectional back view of the downstream portion of water trap **24** specifically showing exhaust pipe **68** and its entrance into water trap **24**. As can be seen in Figure 2, the passage through which air enters water trap **24** features an upward turn of approximately 180° so that air is exhausted in a substantially vertical orientation. The entrance region **92**, which could be part of either toilet **10** (as in Figure 2) or exhaust pipe **68**, includes a barrier **90** which directs the incoming air upward into the downstream portion of water trap **24**. The top of barrier **90** is flush with, or extends slightly above, the water level. Preferably, the top portion of barrier **90** extends in a direction toward the upstream portion of water trap **24** so as to prevent water from the downstream portion of water trap **24** from splashing into sewer pipe **20** and thereby lowering the water level in toilet bowl **14**. Barrier **90** includes a small opening **80** therethrough which serves to fill the entrance region with water and form a proper water seal so as to prevent sewer odors from entering sewer pipe **68**.

In operation, the exhaust of air would be as follows. When air blower **60** is first activated, air would be forced through exhaust pipe **68**. The first flow of air would displace water present in the entrance region **92** upwards, in effect releasing a bubble near the top portion of barrier **90**. The magnitude of the air flow and the size of entrance region **92** are preferably such that once the initial air breaks through to the surface, flow of air to the surface is continuous and no sound-producing bubbles are generated. The trickle of water which enters entrance region **92** through opening **80** will be pulled upward with the air. As soon as air blower **60** is deactivated, water entering entrance region **92** through opening **80** is no longer being removed and quickly fills up entrance region **92**, thereby creating an effective water seal preventing odors from the sewer from entering exhaust pipe **68**. The result of this configuration is a significant reduction in the sound generation while preserving a good seal against sewer odors.

A system according to the present invention may be activated by a manually operated switch or could be activated automatically in any of a number of ways. For example, an automatic switch could be installed so that the blower is activated whenever toilet seat cover **18** is raised or whenever toilet seat **16** is lowered. Alternatively, activation may occur through the use of sensors, such as visual sensors which detect the presence of a user or weight sensors which sense when a user is sitting on toilet seat **16**.

In an alternate embodiment of the present inven-

tion shown in Fig. 9, a separate unit for receiving the collected air and for releasing the air into the sewer pipe downstream of the water trap is provided. This embodiment is suitable both for retrofit applications on existing toilet equipment wherein a hole is drilled, and for use on a new toilet which is formed with an aperture in the toilet bowl.

In Fig. 9, there is shown, in cross-section through the downstream portion of the conventional water trap **24'**, a standard toilet bowl **14'** with an aperture **15** therein for receiving an odor-removing unit **170**. Odor-removing unit **170** is sealed in aperture **15** as by an O-ring **172**.

Odor-removing unit **170** includes an air intake pipe **174** extending, in this embodiment, from an air intake port **176**. Air displacement means **178**, preferably an air blower, is disposed in air intake pipe **174** which ends in a hooked portion **180**. Hooked portion **180** has an inlet **182** into a water-bearing cup element **184** and an outlet **186** into an exhaust pipe (not shown), preferably in the sewer line. According to a preferred embodiment of the invention, hooked portion **180** is twisted such that outlet **186** is perpendicular to inlet **182.**

Cup element **184** includes a shield **188** which extends to or slightly above the water level in toilet bowl **14'**. A small diameter water inlet **190** is provided in shield **188** so that water can flow from water trap **24'** into cup element **184**.

Operation of this embodiment is as follows. When blower **178** is activated, air is drawn in through air intake pipe **174** from the vicinity of the toilet bowl along the path indicated by the arrows. The air is pushed through inlet **182** into cup element **184**. The air pressure is sufficient to push the standing water out of cup element **184**, thus permitting the free passage of odor-carrying air through hooked portion **180** and out outlet **186** to the sewer pipe. When the toilet is flushed or when the blower **178** ceases to blow, cup element **184** is refilled over the top of shield **188**, the level being maintained via water inlet **190**.

It will be appreciated that shield **188** is higher than the highest point of inlet **182** so that odors from the sewer system cannot enter toilet bowl **24'**.

According to a preferred embodiment of the invention, an aperture for the air intake port is integrally formed with the toilet bowl during manufacture. One embodiment of such a toilet bowl is shown in Fig. 10. In this embodiment, air intake port **176'** is formed by making a groove in the rim of the toilet bowl **177'** which is covered, as with a plastic cover, to form pipe **174'** carrying the air to the odor removing unit. Air intake port **176'** may be formed at the end of the bowl, as illustrated, or on the side thereof.

According to another embodiment, shown in Fig. 11, a separate aperture **200** is formed in toilet bowl **202** to form an air intake port adjacent the fresh water inlet aperture **204**. This is particularly suitable for mass production. This embodiment has the added advantage that no water will be accidentally carried to the blower with the odor-carrying air.

Alternatively, a separate odor removing unit may be mounted equally effectively in a location other than the toilet bowl. This permits minimal modification of the existing plumbing unit and is, thus, particularly suitable for retrofitting on existing units. One embodiment of such a unit is shown in Figs. 4 and 5.

The odor removing unit is shown in two side views in Figures 4 and 5. The unit may be installed at any convenient location, for example, mounted onto the outside of the sewer, and can be made of any convenient material, preferably a suitable plastic. Most preferably, the unit is mounted behind a conventional toilet bowl, coupled to the sewer pipe.

The unit includes an inlet **100**, which corresponds to exhaust pipe **68** of Figure 1, for bringing odor-containing air into the unit. The unit further includes an outlet **102** which exhausts air into sewer pipe **20** (Figure 1), preferably into a portion of sewer pipe **20** which is downstream of the water trap and air-filled and where sewer pipe **20** is made of a plastic material. The unit further includes a fresh water inlet **104** which is preferably connected via a small diameter pipe (not shown) to the fresh water feed line of the toilet at a point downstream of the toilet valve, so that water is introduced into the unit through fresh water inlet **104** during flushing of the toilet.

Outlet **102** is located so that its lowest point is above the highest point of inlet **100**. Inlet **100** is located in the side of the unit and its entrance is provided with a shield **106** which is designed to allow air to enter the unit through the water which fills the bottom portion of the unit and inlet **100**. A small hole **108** in shield **106** (Figure 4) allows water from the main compartment of the unit to flow into the area beyond shield **106** until the water level in this area is the same as that of the water in the main compartment of the unit.

In operation the unit functions as follows. When the blower is activated, air is pushed through inlet **100** and rises into the air space at the top of the unit. In the process, the water within shield **106** is pushed outwards together with the air. From there the air exits the unit through outlet **102** directly into the air-filled portion of the sewer pipe downstream of the water trap. When the blower is turned off, water from the main compartment of the unit seeps through hole **108** into the area beyond shield **108**, thereby reforming the water trap which serves to prevent any odor-carrying air from travelling from the sewer through outlet **102** and through inlet **100** and back into the room. Whenever the toilet is flushed, a small amount of water flows into the unit to ensure that the water level is at the proper level at all times.

In the embodiment of Fig. 1 described above, the odor-carrying air is released into the toilet bowl, which

is typically made of a suitable ceramic. It will be appreciated that creating an opening in an existing ceramic toilet bowl may be complicated or expensive. In the embodiment of Fig. 4, on the other hand, the release point is preferably well downstream of the water trap in the portion of the sewer pipe which is typically made of plastic, such as PVC, rather than ceramic. It is generally much easier and less expensive to drill a hole into a plastic pipe.

Referring now to Fig. 6 there is shown an alternate embodiment of the invention which is similar to that shown in Fig. 4 but is particularly suited for use in a kitchen sink or other sink in an area from which it is desired to remove odors. In this embodiment, the air inlet **100'** and shield **106'** are located outside the siphon **101** of the sink.

In this embodiment, an aperture **103** with screw threads is formed in the conventional siphon **101** of a sink (not shown). An odor removing unit according to the invention is screwed onto aperture **103**. The unit includes an air inlet **100'** and a shield **106'**. The siphon **101** is coupled to a sewer pipe (not shown) through an outlet **102'**.

Operation of this embodiment is substantially the same as that of Fig. 4. Water from the sink fills the siphon **101** and the bottom of the odor removing unit through fresh water inlet **104'**. When it is desired to remove odors from the area of the sink, including cooking odors and so on from the kitchen, a blower in the unit (not shown) is activated and the odor-carrying air is blown into inlet **100'**. The air pressure forces the water out from shield **106'** and the air is free to flow out through siphon **101** and through outlet **102'** to the sewer pipe.

Referring now to Fig. 7, there is shown an alternate embodiment of the system of the present invention wherein a unit **110** for receiving and releasing the collected air is inserted into the fresh water feed line **112** of toilet **114** and coupled to sewer pipe **120**. In this embodiment, fresh water feed line **112** performs two additional functions: sucking air and odors into unit **110** and providing water to a cup element which acts as a one-way valve to prevent odors from returning from the sewer pipe into the toilet.

Unit **110** includes an inlet **116** and an outlet **118**. An arched pipe **122** couples inlet **116** with outlet **118** via an air blower **124** and a water-bearing cup element **126**. Pipe **122** ends in a hooked portion **123** from which water can be pushed by air pressure into cup element **126**. Most preferably the hooked portion is curved such that the outlet is perpendicular to the longitudinal axis of the inlet. Hooked portion **123** is provided with a small fresh water inlet aperture **125** through which water from cup element **126** enters to refill hooked portion **123**.

Air and odors flowing through hooked portion **123** pass through an outlet pipe **134** into sewer pipe **120**, preferably downstream of the water trap of the toilet (not shown). A ball valve **128** is seated in inlet **116** and is retained therein by stop members **130** and **132**.

The method of operation of this system is as follows. Odor-carrying air is sucked through inlet **116** of air intake pipe **122** and pushed through hooked portion **123** by air blower **124**. The air pushes the water out of hooked portion **123** into cup element **126** and then flows freely through pipe **134** into sewer pipe **120**. As shown, ball valve **128** is seated by gravity against stop member **132** permitting the passage of air therepast.

When the toilet is flushed, fresh water flows through pipe **112** both to toilet **114** and into inlet **116** of pipe **122**. The water pressure urges ball valve **128** to seat against stop member **130**, thereby preventing passage of water through pipe **122**. At the same time, water flows through a small diameter pipe **136** coupling the fresh water feed pipe **112** with cup element **126** to maintain the desired water level in hooked portion **123**. When the flushing water ceases to flow, ball valve **128** returns to the open position against stop member **132**, as illustrated. It will be noted that the inner wall **127** of pipe **122** entends below the inlet to pipe **134**, thereby preventing the backflow of air therethrough.

Referring now to Fig. 8, there is shown a schematic illustration of yet another embodiment of the present invention for use in a toilet which is particularly aesthetic. In this embodiment, a unit **150** for receiving and releasing collected air is disposed inside the fresh water tank **152**. Unit **150** includes a air blower **154** which sucks the collected odor-filled air from toilet **156** through a pipe **158**. The collected air is pushed by air blower **154** through a pipe **155**, which ends in a hooked portion **177** similar to that in Fig. 7. The air is blown through a water-bearing cup element **160** and out through an outlet pipe **162** to sewer pipe **164**. Cup element **160** defines a small fresh water inlet aperture **166** for permitting the inflow of water into the cup element to maintain the desired water level. A shield **168** depends into cup element **166**, the bottom of shield **168** being lower than the lowest part of inlet **157** to exhaust pipe **162** so as to prevent the return of exhaust gases therethrough. Operation of this embodiment is substantially the same as that of Fig. 7.

It is a particular feature of the embodiments of Figs. 4 through 9 that the water trap formed by the hooked portion of the inlet pipe and the cup element acts as a one-way valve for odors, preventing their return from the sewer into the toilet or kitchen. It is a further particular feature of these embodiments that there is virtually no bubbling noise during their operation. This is due to the angled twist and the smooth walls of the hooked portion of the air intake pipe which permit the ready outflow of the water therein upon application of air pressure. Thus, no additional silencing means are required.

It will be appreciated that the system and method according to the invention are very reliable. Even if there is a power failure or the blower doesn't operate for any other reason, the system continues to act as a one-way valve for odors, preventing their return to the area of the toilet or kitchen.

It is a further particular feature of the invention that it does not interfere with the outflow of water and waste through a toilet or sink to which it is connected. The waste water continues to flow unimpeded through its usual pathway, and without soiling the elements of the system.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.

Claims

1. A system for reducing odors associated with a plumbing unit comprising:
   (a) at least one air intake port disposed in the vicinity of the plumbing unit;
   (b) air displacement means for inducing air into said at least one air intake port; and
   (c) a piping system through which the air from said at least one air intake port moves to an exhaust location;
   characterized in that said exhaust location is in a water trap associated with the plumbing unit.

2. The system of claim 1, wherein:
   (a) said plumbing unit is a toilet having a water trap with an upstream portion and a downstream portion; and
   (b) said exhaust location is in the downstream portion of said water trap.

3. The system of claim 1, wherein the plumbing unit is coupled to a sewer pipe and includes a fresh water inlet, and said exhaust location is in a water trap defined in a separate odor-removing unit coupled between the plumbing unit and said sewer pipe.

4. A system as in claim 1, wherein said air displacement means is an air blower.

5. A system as in claim 4, wherein said piping system includes take-up piping from said at least one air intake port to said air blower and further includes exhaust piping from said air blower to said exhaust location.

6. A system as in claim 2, further comprising sound muffling means for muffling the sound of exhausted air entering the downstream portion of the water trap of the toilet.

7. A system as in claim 6, wherein said sound muffling means includes a barrier at the entrance of the exhausted air into the downstream portion of the water trap of the toilet, whose top extends upward to at least the water level, which barrier serves as a water seal between uses of the system.

8. A system as in claim 7, wherein said barrier includes an opening which serves to allow water to fill said water seal when said air displacement means is not activated.

9. A system as in claim 2, wherein at least one of said air intake ports is located in the vicinity of the toilet.

10. A system as in claim 9, wherein the toilet includes a toilet seat and wherein at least one of said air intake ports is located in the toilet seat.

11. A system as in claim 9, wherein at least one of said air intake ports is located in the toilet bowl.

12. The system as in claim 3, wherein said plumbing unit comprises a toilet having a fresh water tank and said odor removing unit is disposed within said fresh water tank.

13. The system as in claim 3, wherein said odor removing unit includes:
   (i) an air inlet coupled to the toilet;
   (ii) an air outlet coupled to a sewer pipe; and
   (iii) a water-bearing cup element forming a water trap in the unit between said air inlet and said air outlet, said cup element having a fresh water inlet for inputting fresh water thereto.

14. The system as in claim 3, wherein said plumbing unit is a toilet coupled to a sewer pipe and having a fresh water feed pipe, and said odor removing unit is coupled between said fresh water feed pipe and said sewer pipe.

15. A system for reducing odors associated with a toilet having a water trap having an upstream portion and a downstream portion, comprising:
   (a) at least one air intake port;
   (b) air displacement means for inducing air into said at least one air intake port; and
   (c) piping system through which the air from said at least one air intake port moves to an exhaust location;
   characterized in that said exhaust location is in the downstream portion of the water trap of the

toilet.

16. A system for reducing odors associated with a toilet, the toilet having a water trap coupled to a sewer pipe and having a fresh water tank coupled thereto by a fresh water feed pipe, comprising:
    (a) at least one air intake port;
    (b) air displacement means for inducing air into said at least one air intake port;
    (c) an odor removing unit; and
    (d) a piping system through which the air from said at least one air intake port moves to said odor removing unit and from said odor removing unit to an exhaust location in a sewer downstream of the water trap of the toilet.

17. A system as in claim 16, wherein said odor removing unit includes:
    (i) an air inlet;
    (ii) an air outlet; and
    (iii) a fresh water inlet for inputting fresh water so as to form a water trap in the unit between said air inlet and said air outlet.

18. A system as in claim 16, further comprising sound muffling means for muffling the sound of exhausted air entering said odor removing unit, said sound muffling means including an upturned entrance of the exhausted air into the downstream portion of the water trap of the toilet.

19. A system as in claim 16, wherein said odor removing unit includes a shield at the entrance of the exhausted air into said odor removing unit, whose top extends upward to at least the water level in said odor removing unit, which barrier serves as a water seal between uses of the system.

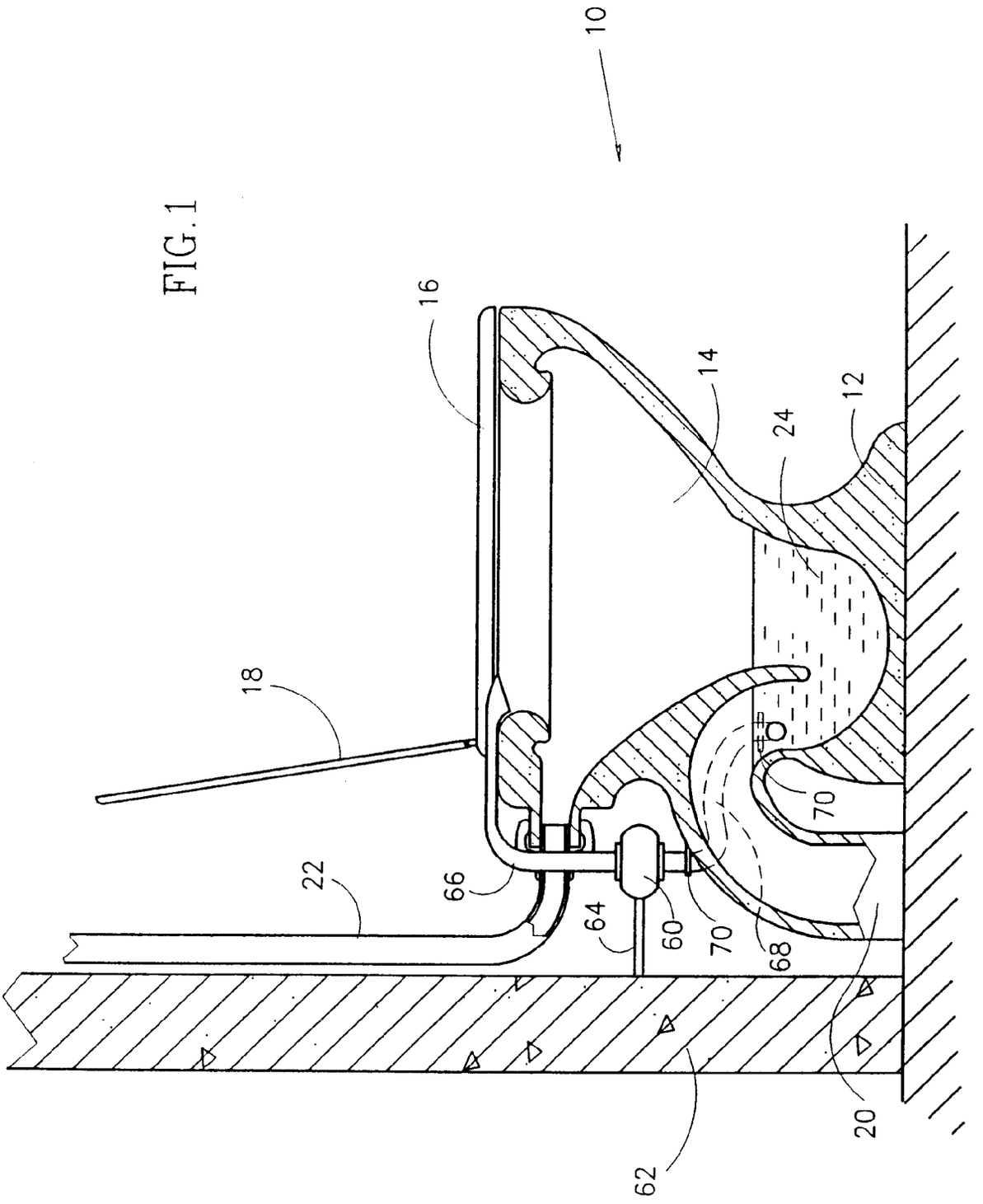
20. A system as in claim 19, wherein said shield includes an opening which serves to allow water to fill a portion of said odor removing unit when said air displacement means is not activated.

21. A method for reducing odors associated with a plumbing unit coupled to a sewer pipe comprising:
    collecting air containing odors from the vicinity of the plumbing unit and exhausting said air into the downstream portion of a water trap associated with the plumbing unit.

22. A method as in claim 21, wherein said collecting and exhausting is effected using an air blower.

23. A method as in claim 22, wherein said collecting is effected using at least one air intake port and take-up piping from said at least one air intake port to said air blower and wherein said exhausting is effected using exhaust piping from said air blower to said water trap.

FIG.1



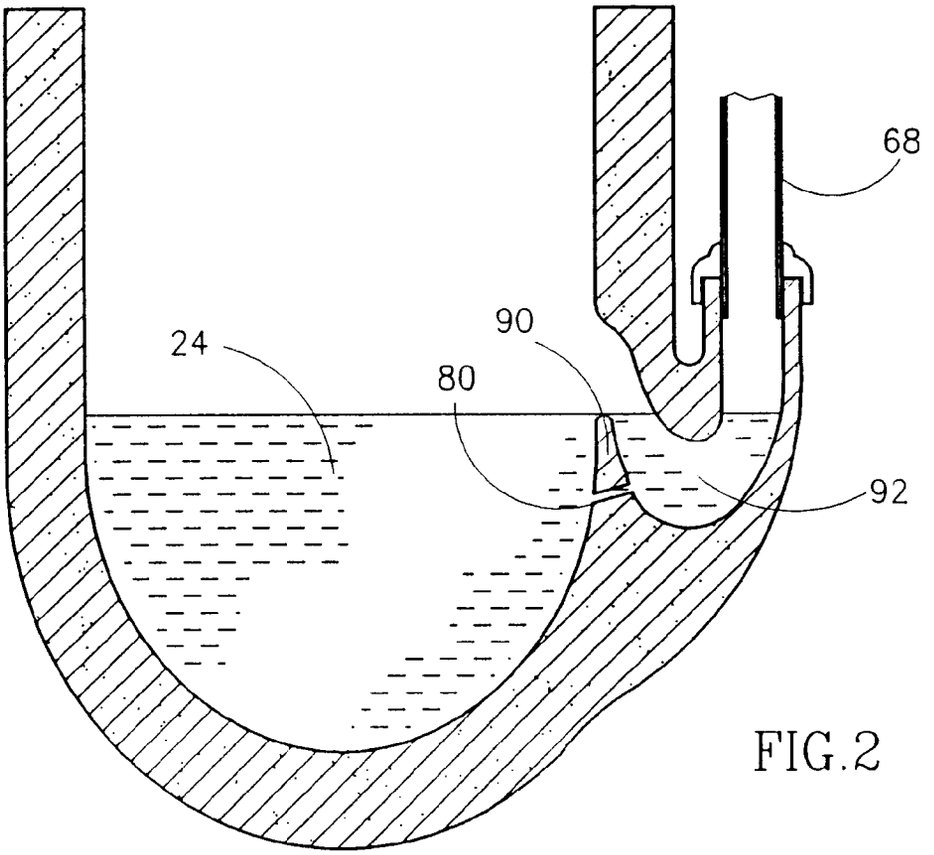


FIG.2

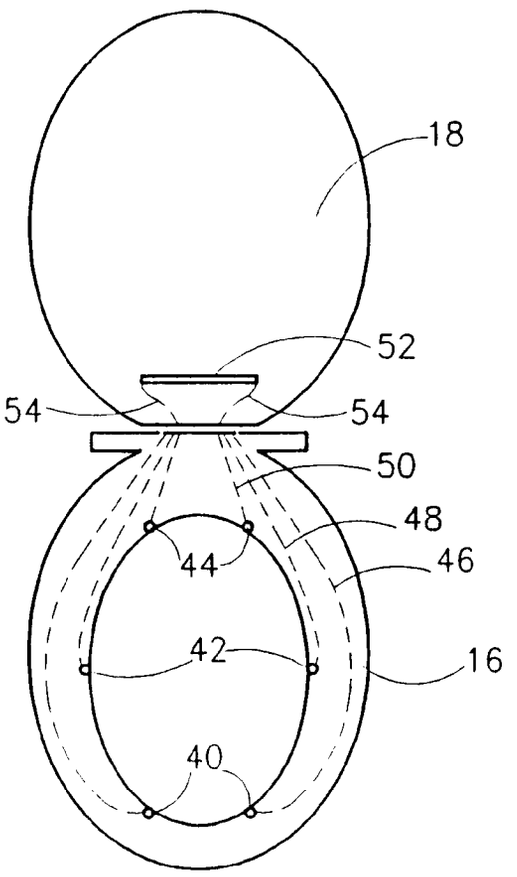


FIG.3

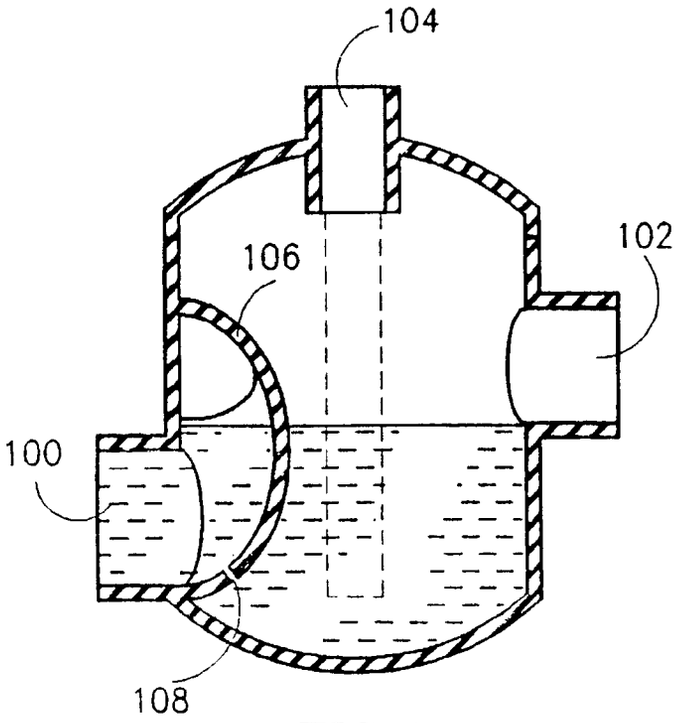


FIG.4

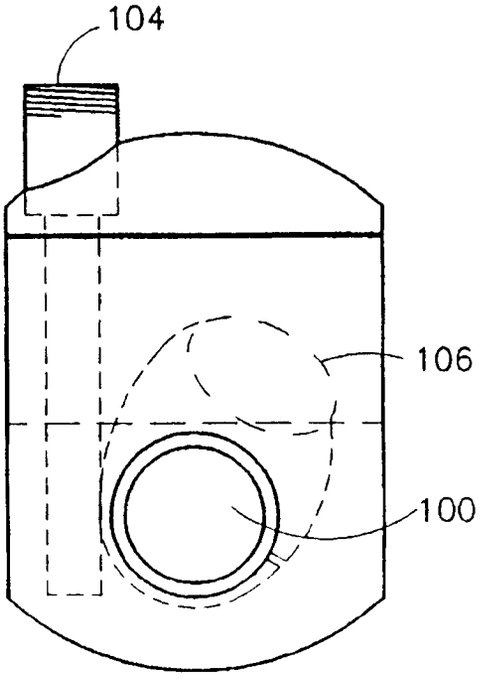


FIG.5

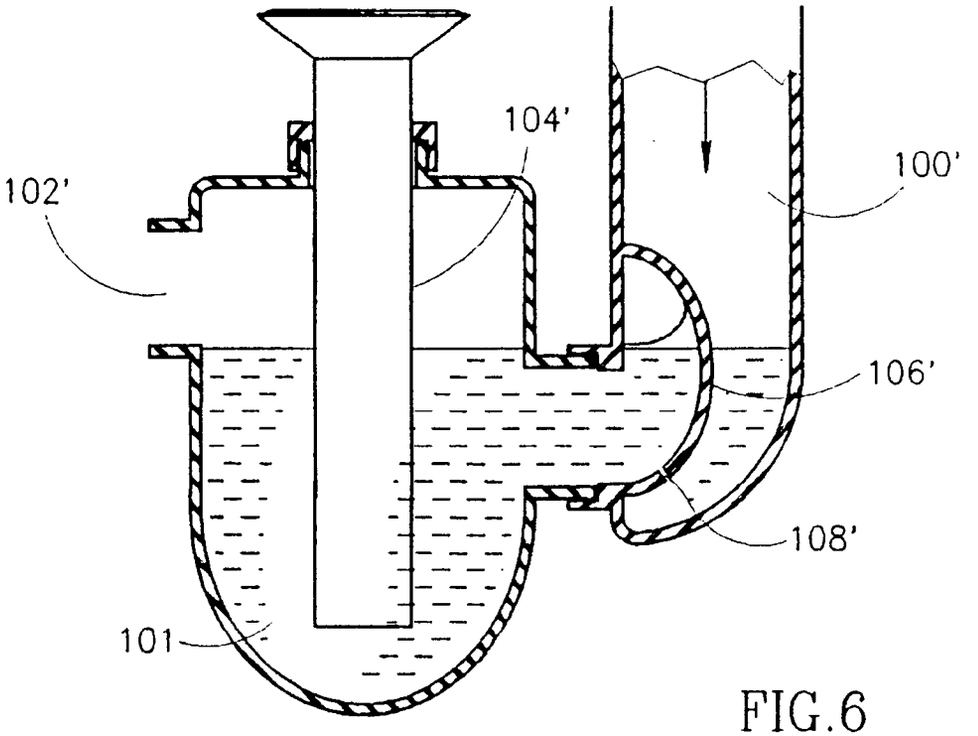


FIG.6

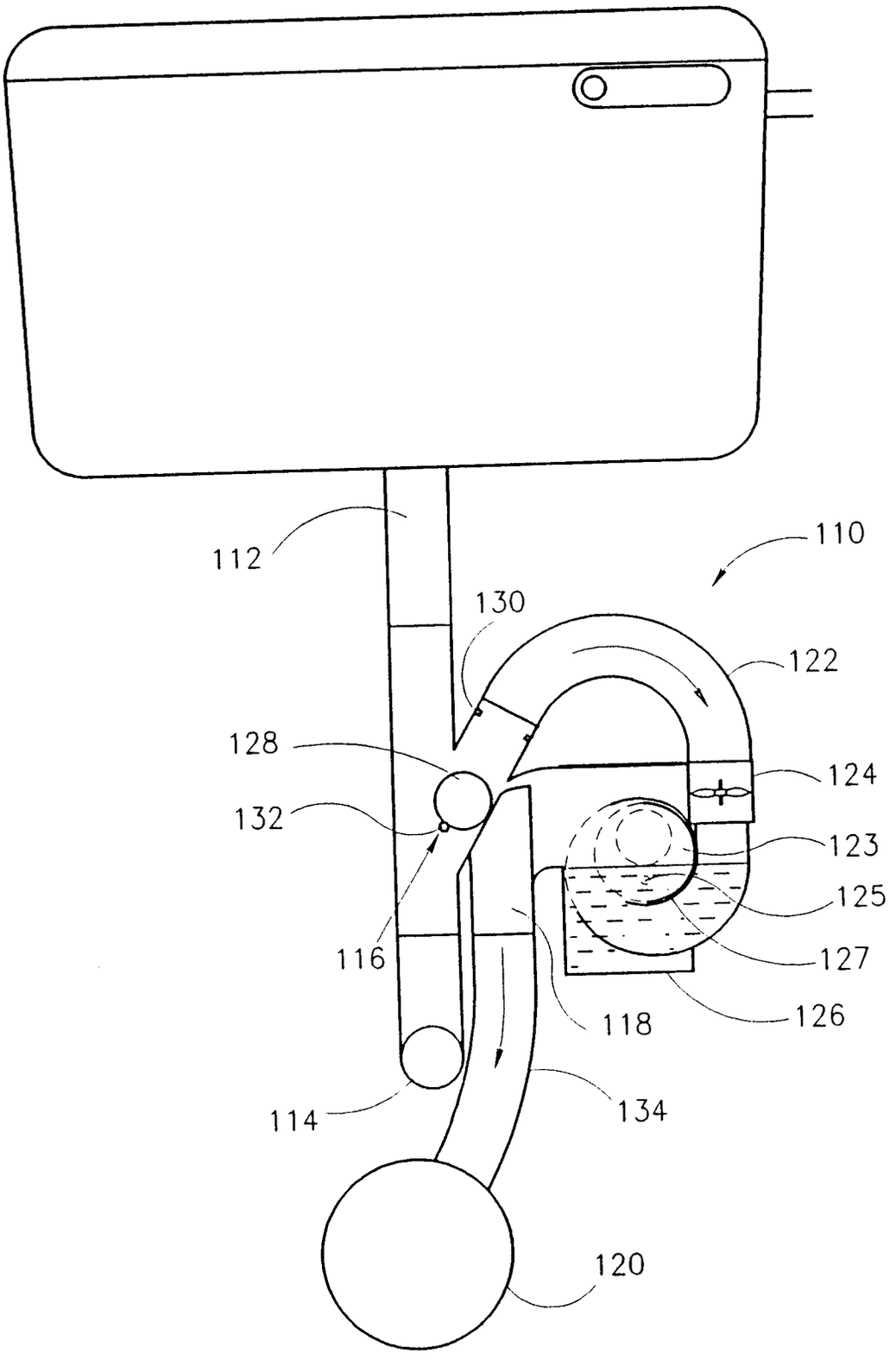


FIG.7

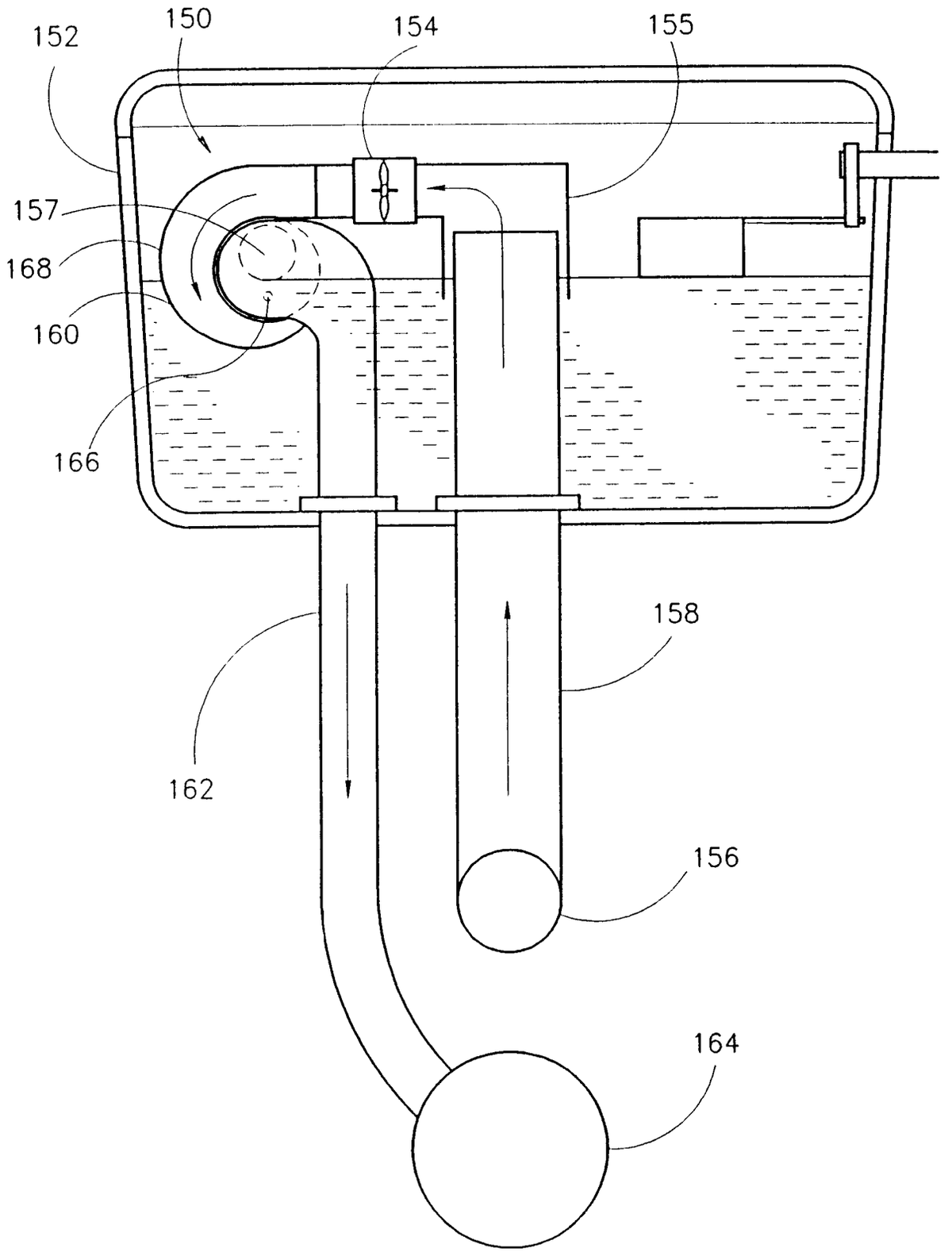


FIG.8

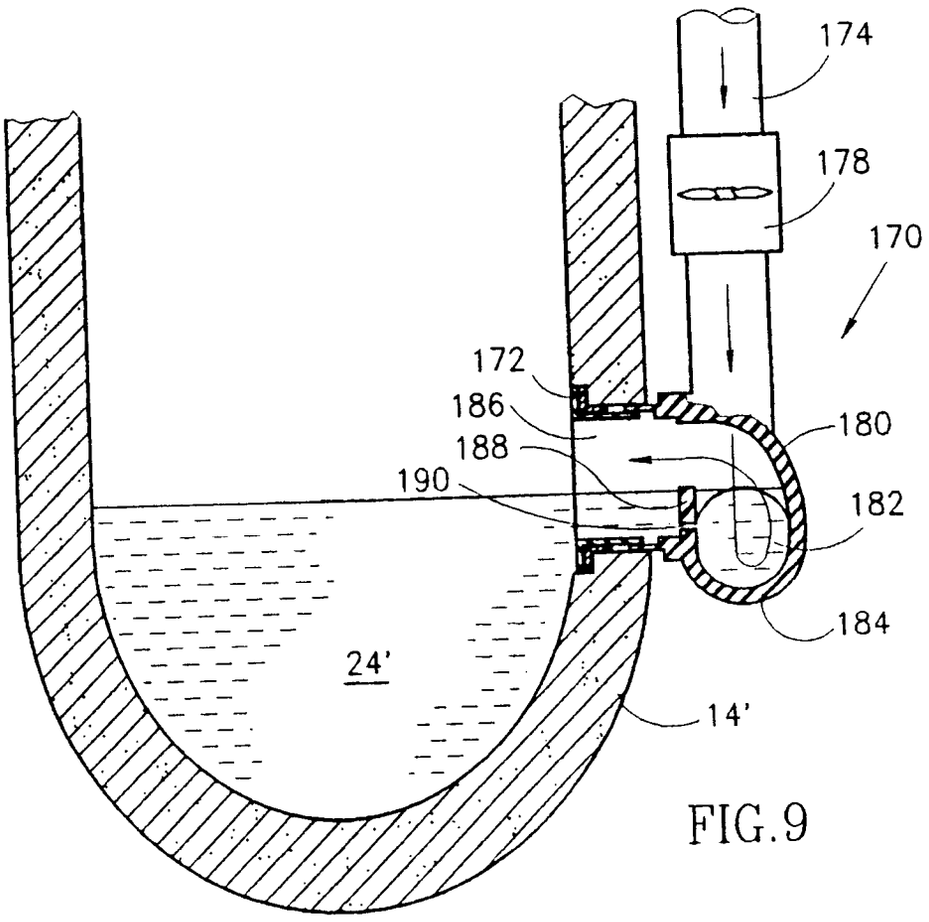


FIG.9

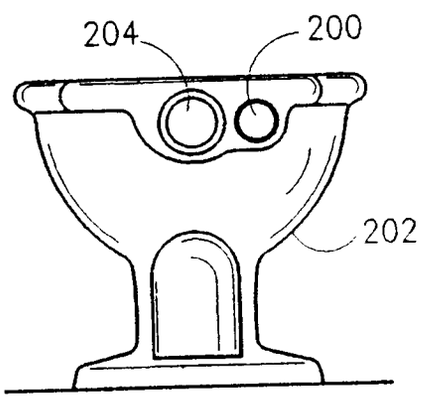


FIG.11

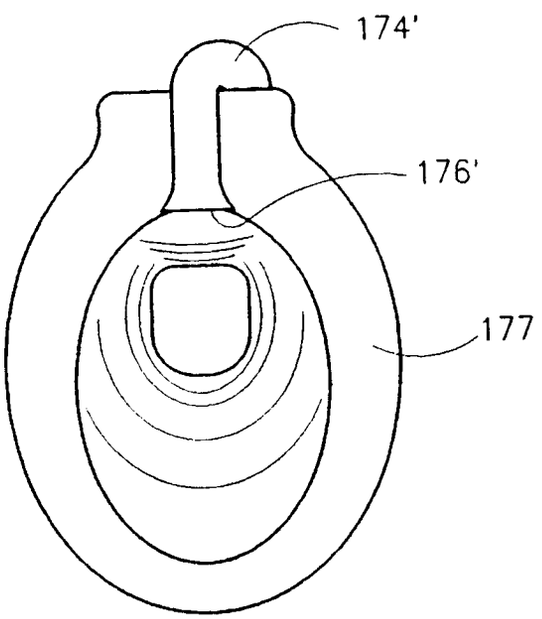


FIG.10