United States Patent

Russell

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[54] **VENTILATED TOILET**

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[52] **U.S. Cl.** **4/216**

[51] **Int. Cl.** **E03d 9/05**

[58] **Field of Search** 4/209, 216, 211, 217, 212, 4/218, 213; 137/525, 127

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Assistant Examiner—Donald B. Massenberg
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[57] **ABSTRACT**

My invention comprises an improved ventilator means for a toilet. The ventilator means includes a suction means having a regulating valve to reduce suction in the toilet flush tank when the toilet is flushed.

4 Claims, 12 Drawing Figures

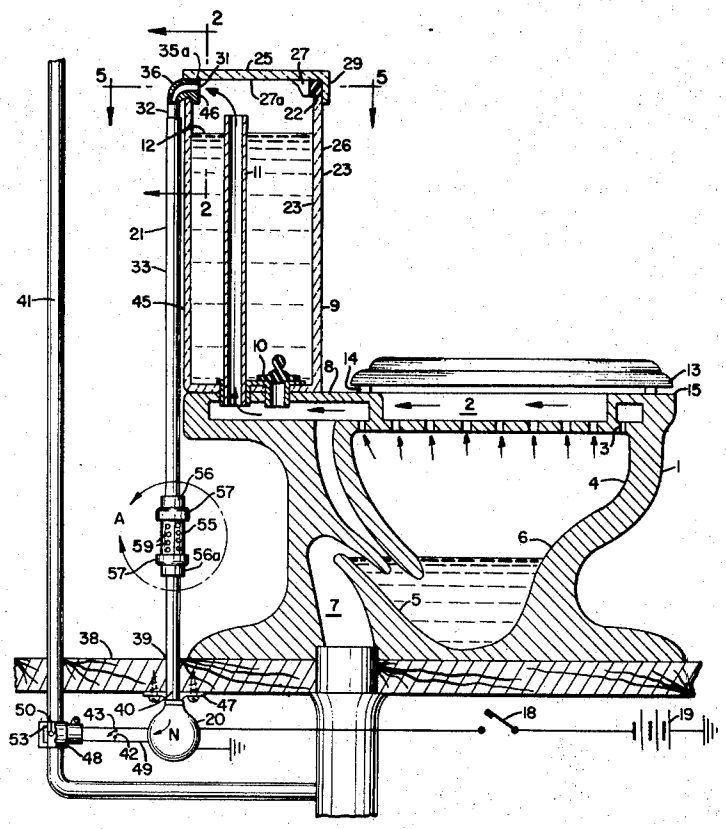


FIG.1

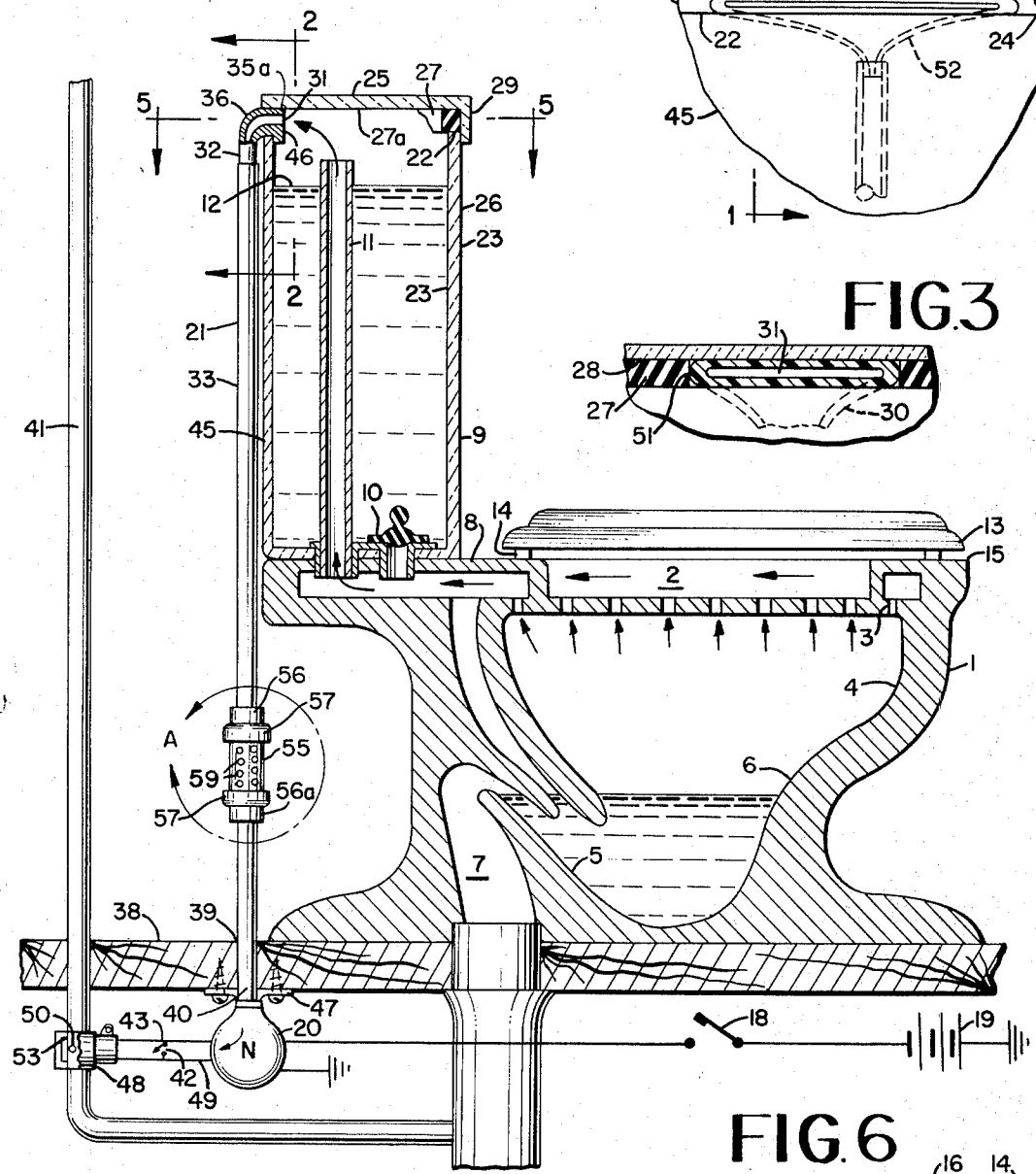


FIG.2

FIG.3

FIG.5

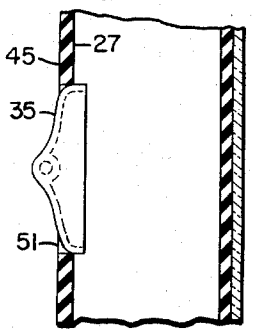


FIG.4

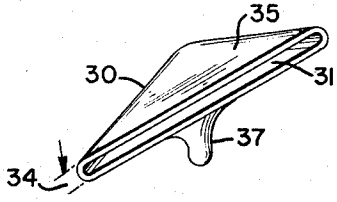


FIG.6

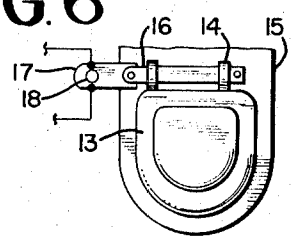


FIG. 8

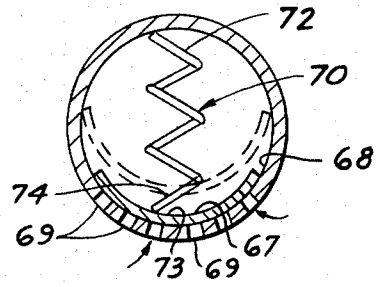
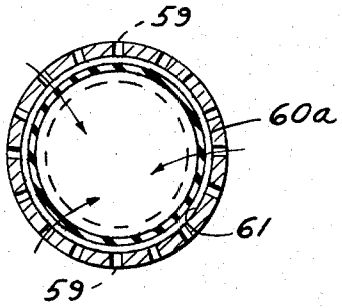


FIG. 10



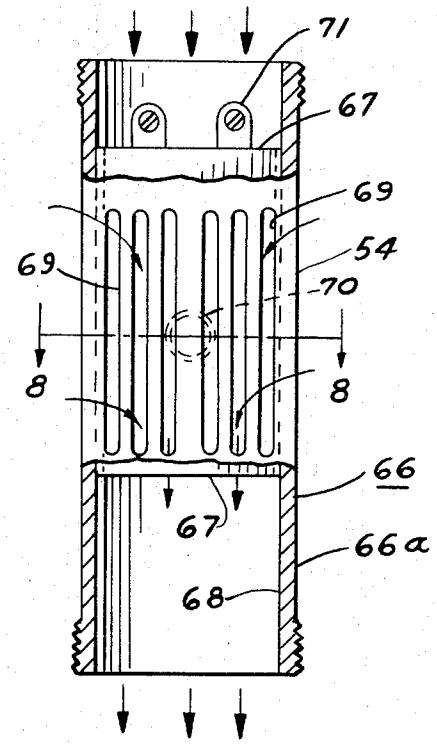


FIG. 7

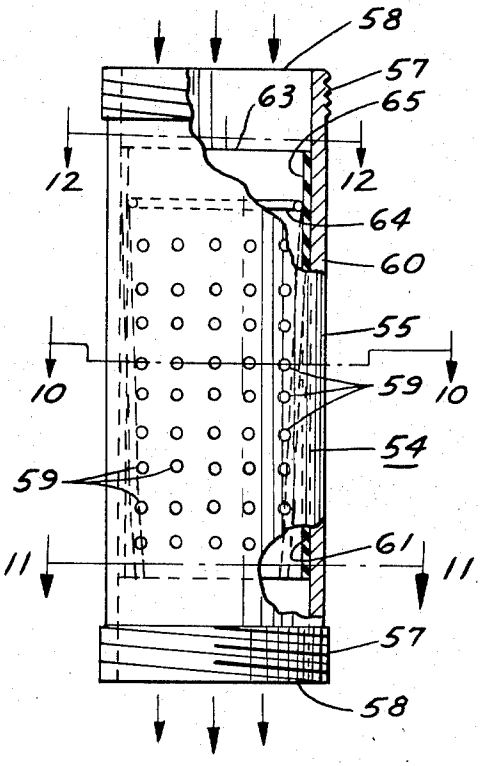


FIG. 9

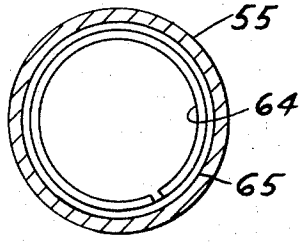


FIG. 12

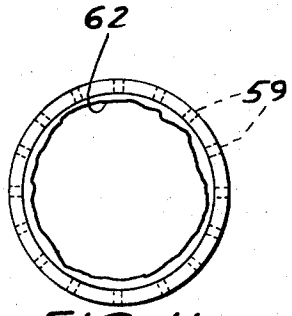


FIG. 11

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VENTILATED TOILET

This invention relates to a device for drawing or expelling odorous gases from a toilet.

The problem of removing gases or ventilating toilets, especially of the type commonly used in homes throughout the nation, has been known for some time, and considerable effort has been expended in the past to remedy or provide a solution to this problem; but most of these devices have been too cumbersome, unwieldly, expensive to install, or were not adapted for ready installation on the conventional toilet which are used in millions of homes at the present time.

It is therefore an object of this invention to provide an improved device or apparatus for drawing or expelling gases from a water closet or toilet wherein it is provided that said device is adapted for application to a conventional toilet without requiring modification or alteration in the flush tank thereof.

It is a further object of this invention to provide an inexpensive deodorizing unit for toilets which may be readily installed by any handy man.

It is a further object of this invention to provide a unique closure and suction means for use with a conventional flush tank to substantially seal said tank to restrict the flow of air between the tank and the cover thereof.

It is another and further object of this my invention to provide a relief valve for relieving the forces of suction to allow rapid and uninterrupted exit of water from the toilet flush tank to properly flush the toilet bowl during the toilet flushing operation.

Other and further objects of this invention will become apparent from the following description, claims, and drawings, in which:

FIG. 1 is a view taken of the device along line 1—1 of FIG. 2 also showing a schematic wiring diagram of the power unit used in this device;

FIG. 2 is a partial sectional view taken along 2—2 of FIG. 1, showing a nozzle without a gasket;

FIG. 3 is a partial plan view taken along line 2—2 of FIG. 1 showing the suction unit, seal or gasket and cover as assembled to use;

FIG. 4 is an isometric drawing of the suction outlet or nozzle;

FIG. 5 is a plan view of the nozzle unit taken in direction of arrows 5—5;

FIG. 6 is a plan view of the toilet bowl and seat showing the electric switch arrangement;

FIG. 7 is an elevated view of a modified suction relief valve;

FIG. 8 is a plan sectional view of the suction relief valve FIG. 7 taken along line 8—8 of FIG. 7;

FIG. 9 is an elevational view of the preferred version of the suction relief valve utilized in the instant invention;

FIG. 10 is a sectional plan view of the suction relief valve taken along lines 10—10 of FIG. 9;

FIG. 11 is a sectional view taken along line 12—12 of FIG. 9 showing the suction relief valve closed;

FIG. 12 is a sectional view taken along lines 12—12 of FIG. 9 showing the means of attachment.

In FIG. 1 there is shown a toilet bowl 1, provided at its upper side with an annular water channel 2 having formed therein water inlets 3 opening into the upper side 4 of the toilet bowl 1. The bottom of the bowl is shaped to form an outlet trap 5 in the entrance 6 which has an exit 7. The inlets 3 of the bowl connect through an inlet conduit 8 with a flush tank 9, whose outlet is controlled by the conventional ball closure and associated operating means 10. (Only ball is shown).

Connected to said bowl inlet conduit 8 is an overflow stand pipe 11, which extends upwardly to a point well above the normal level 12 of water in the tank 9. If said water reaches a level above the stand pipe 11 it flows downwardly back through conduit 8 into said bowl. It is understood that conduit 8 and stand pipe 11 provide a closed, water tight path or closed circuit for passage of air when said ball closure means 10 is in position stopping the flow of water from said tank 9.

The bowl 1, as shown in FIG. 6, is provided with a seat 13 which is hinged at 14 to the upper surface 15 of said bowl by conventional attachments including support arm 16 which clamps switch bracket 17 of switch 18 to said upper surface 15 of said bowl. The switch 18 is connected across a source of electrical energy 19, and when closed energizes motor and fan unit 20. The operation of the motor 20 in connection with the other features of the invention will become apparent with the disclosure of the auxiliary suction or nozzle unit 21 which is adapted for use with a flush tank 9 and which is further described as having a generally open top 22 shaped to form a closed storage space for water, said top 22 having substantially vertical inside and outside coterminous walls 23 extending downwardly therefrom to define a flat narrow annular rim ledge or lip 24 at said top for receiving a cover or lid 25. Said cover is shaped to have downwardly depending flanges 29 extending substantially about the front 26 and sides 27*a* of the cover to overlap said lip.

Referring to FIGS. 1 and 3 in the drawing hereof, a gasket or seal 27, comprised of a strip of resilient material such as rubber or welt is placed between said lip and the generally flat undersurface or canopy 28 of said cover, bearing on said lip substantially around the perimeter of said tank, the thickness of said gasket 27 being arranged and adapted so that the flanges 29 of said cover will substantially overlap said tank lip 24 when said gasket 27 is in place on said lip and said cover placed over said gasket.

The auxiliary suction or nozzle unit 21 includes a generally fan shaped oblong nozzle 30 (FIG. 3) arranged to taper gradually to blend from the slitted elongated opening 31 to the upper circular opening 32 of conduit 33. The nozzle width 34 is proportioned, arranged and adapted so that same is interposed and fitted into elongated slot 51 provided in said gasket 27 with said fan shaped nozzle 30 adapted to extend into the flush tank 9 with the generally flat supporting undersurface 28 of said cover 25 resting substantially flush on the seal or gasket 27 and top rim or surface 35*a* of said nozzle 30.

The fan shaped portion 35 of said nozzle 30 is likewise reversely bent downwardly of said tank 9 to avoid a house interior wall (not shown) or other obstruction, and to direct the exterior conduit pipe 33 connected to the annular opening 37 of said nozzle 30 vertically through the floor 38 at point 39 to fan unit opening 40 and thence to the ventilating stack 41 or if preferred, directly to the outside of the building. Spacer or seal 27 also operates to raise level of cover 25 so that a nozzle 30 may be inserted in between cover 25 and water closet or tank 9.

In operation, the gasket or seal **27** restricts the flow of air between said cover **25** and lip **24** of said tank **9**, and the suction unit **21** when energized by closing switch **18** creates a suction expelling gases from outlets **3** inside the bowl **1** through conduit **8**, through stand pipe **11**, through fan shaped nozzle opening **31** and annular circular opening **37**, through exterior conduit pipe **33**, through motor and fan **20** to the ventilating stack **41**, or to the outside of the building, if said conduit pipe **42** is extended opposite said motor and fan **20** directly through the outside building wall (not shown).

A valve **42** may be provided at point **43** in exhaust pipe **49** to prevent back flow of gases into the toilet bowl.

Many standards or conventional flush tanks in common use have a narrow gap or opening **44** (FIG. **2**) at the back side **45** between the cover and the upper lip of the tank to permit air to enter or escape and allow the water in the tank to escape rapidly to flush the bowl properly. Should this slit or gap **44** exist, a further elongated fan shaped nozzle **52** may be adapted to be spread out in this opening **44** between side and cover and held by a tab **46**. Said nozzles **30** and **52** are preferably constructed of a pliable plastic material such as polyethylene. A seal (not shown) may be provided for the length of the gap not closed by the nozzle **52** and in these adaptations the seal or gasket **27** need not extend completely around the upper perimeter of the tank **9**.

Brackets and clamps **47** of suitable structure are used to secure said pipe **33** to said floor **38** a suitable stack clamp and bracket **48** is utilized to secure the exhaust pipe **49** to said stack **41**.

It is preferred that several small bores **50** be made in said stack **41** and a clamp **48** provided with a seal **53** so that the gases will be forced out through said stack, and not escape into the basement or other structure beneath the toilet.

A suction relief regulating valve means shown generally in circle A, FIG. **1**, is interposed between the source of vacuum or blower **20** and the toilet flush tank **9** to relieve the suction in the system during flushing of the toilet when the water **12** rises up the said stand pipe when the tank **9** is flushed interrupting flow of air up said stand pipe. It is desirous to relieve the forces of suction at that time, because a strong vacuum is created inside the water tank closure **24***a* when said stand pipe is closed off, causing the water to gurgle out of the tank **9** too slowly to flush the toilet properly.

In a preferred version of the regulating valve means shown in FIGS. **9**, **10**, **11**, and **12**, the inventor has provided a generally elongated cylindrical valve body **55** having threads **57** at each end **58** connected into conduit pipe **33** by an upper pipe union **56** and a lower pipe union **56***a*. A plurality spaced air inlet passages or bores **59** are drilled or otherwise provided in wall **60** of said body for passage of air therethrough under controlled circumstances.

The passage of air through said passages **59** is controlled by means of a flexible elongated inner liner valve element **60***a* preferably comprised of a rubber-like material which is mounted circularly on the inside wall surface **61** of said valve body and is biased to cover said passages and substantially block passage of air through said passages when there is normal suction in the system. However, when the vacuum source is operating, the toilet flushed, and the stand pipe is flooded, the suction or vacuum reaches a higher level and said liner valve element is adapted to move or collapse inwardly, as shown in FIG. **10**, when the suction or vacuum reaches a level in the system which will restrict the flow of water from said tank, allowing air to pass inwardly through said passages relieving and normalizing suction in said system and allowing water to flow from said tank in a normal manner for flushing during the time said stand pipe contains water. When water leaves said stand pipe, after flushing of said tank, said liner flexes outwardly as shown in FIG. **11**, closing said apertures or passages, causing said suction source **20** to suck air from said stand pipe and bowl **1** as previously described. The upper end portion **63** of said liner valve element **60***a* is secured to the inside wall **61** by a slit circular expansion ring **64** which engages upper extremity inner surface **65** of said valve element **60***a* holding said valve element against said valve inside wall in the operative relationship with said passages described supra.

A modification of the valve means **54** is shown in FIGS. **7** and **8** and discloses a valve means **66** having a valve body **66***a* fastened into pipe **33** in the same manner as described for valve means **54**, but differing therefrom in the operation of the valve arrangement. In the modification, the inventor has provided a semi-circular, close fitting, non-porous valve member **67** extending substantially one-half way around the cylindrical inside wall **68** of said valve body **66***a*.

Elongated axial slots or passages **69** are provided opposite said valve member **67**. The valve member **67** is normally biased and adapted by a pressure means or spring **70**, to close off said passages to prevent passage of air therethrough by engaging inside wall **68**, however the valve member **67** is adapted to move inwardly in response to suction from within the pipe **33**, allowing air to pass inwardly through said passages.

Tabs **71** are connected to said valve member **67** and securely fastened to inside wall **68** to hold said member **67** in location over said slots or passages **69**. Said spring **70** is compressed and extends transversely across the inside of said pipe **33** with one end **72** engaging the inside wall **68** and the other end **74** engaging the inside wall **73** of said valve member **67**.

Having thus described my invention, I claim:

1. In combination with a water closet flush tank having bottom walls and vertical exterior and vertical interior side walls terminating at their upper extremity in a generally horizontal substantially rectangular annular ledge, said tank adapted to be filled to a predetermined level adjacent said ledge to define an air space between said water level and said ledge;

water closet flush tank water regulating means including an overflow stand pipe sealingly secured through said tank bottom having the free end thereof extending into said airspace above said water level, said stand pipe adapted for connection to water inlets in an associated toilet bowl to cause air and water to flow directly from said tank through said toilet inlets in the event of a water overflow in said tank;

an improved ventilator therefor comprising suction means in cooperative relationship with said tank including a suction supply source, a nozzle of

generally fan shaped outline defined by outlet walls located externally of said tank representing an aperture, said outlet walls fanning outwardly to form inlet walls having a substantially elongated top surface and a substantially elongated bottom surface defining a narrow oblong inlet aperture disposed inside of said tank at the rear portion thereof with said bottom surface mounted on and terminating adjacent the back side of said ledge so that said elongated top inlet surface is spaced narrowly above said ledge to cause the height of said tank not to be substantially increased and to distribute the suction forces of said suction means uniformly along said tank ledge;

cover means including a lid having generally flat substantially sealed canopy walls mounted on said annular tank ledge and said inlet top surface and a downwardly depending flange extending from said canopy walls adapted to overlap said vertical walls of said tank on front and sides thereof with said nozzle in place on said tank ledge and to clear said nozzle on the back side thereof, said suction means operable to reduce air pressure in said tank whereby offensive vapor is drawn from an associated toilet bowl through said toilet bowl water inlets, and through said stand pipe and said nozzle to be removed;

and regulating valve means operable to reduce suction in said tank when water rises up said stand pipe upon operation of said tank water regulating means.

2. In combination with a water closet flush tank having a bottom wall and vertical exterior and adjacent vertical interior side walls terminating at their upper extremity in a generally horizontal annular ledge, said tank adapted to be filled with water to a predetermined level adjacent said ledge to define an air space between said water level and said ledge;

water closet tank water regulating means including an overflow stand pipe sealingly secured through said tank bottom having the free end thereof extending into said air space above said water level, said stand pipe adapted for connection to water inlets in an associated toilet bowl to cause air and water to flow directly from said tank through said toilet inlets in the event water overflows in said tank;

an improved ventilator therefor comprising suction means in cooperative relationship with said tank including a suction supply source, a nozzle wall defining an aperture located externally of said tank, said outlet walls connected to inlet walls having a substantially elongated top surface and a flat substantially elongated bottom surface defining a narrow oblong inlet aperture disposed inside the back side of tank with said bottom surface mounted on said ledge so that said top inlet surface is spaced narrowly above said ledge to cause the height of said tank not to be substantially increased and to distribute the effect of suction forces produced by said suction means uniformly along the back side of said ledge and cover means including a lid having an undersurface extending over said tank, a concealed seal member interposed between said lid undersurface and said tank ledge to raise the level of said lid to accommodate the entrance of said nozzle between said lid and the back side of said tank, said lid having a downwardly depending flange operable to overlap said ledge of said tank with said seal in place on front and sides thereof, but adapted to clear said nozzle on the back side thereof, to substantially seal said tank in cooperation with said nozzle inlet aperture, to cause said suction means to reduce air pressure in said tank whereby offensive vapors are drawn from an associated toilet bowl through connected toilet bowl inlets and said stand pipe and said nozzle to be removed;

and regulating valve means including a relief valve connected between said suction supply source and said flush tank operable to reduce suction in said tank when water rises up said stand pipe upon operation of said water regulating means.

3. In combination with a water closet flush tank means having bottom walls and side walls and a cover for the tank, said tank adapted to be filled to a predetermined level;

water closet flush tank water regulating means including an overflow stand pipe associated with said tank having the free end thereof extending into said air space above said water level, said stand pipe adapted for connection to water inlets in an associated toilet bowl to cause air and water to flow directly from said tank through said toilet inlets in the event of a water overflow in said tank;

an improved ventilator therefor comprising suction means in cooperative relationship with said tank including a suction supply source having a suction element connected with said tank operable to exhaust air from said tank whereby offensive vapors are drawn from an associated toilet bowl through said toilet water bowl inlets by way of said stand pipe; and regulating valve means operable to reduce suction in said tank when water rises up said stand pipe upon operation of said tank water regulating means.

4. The invention as set forth in claim 3 wherein the suction supply source includes an electrically powered suction element and the regulating valve means is connected in suction relieving relationship to said tank between said tank and said suction element.

* * * * *