VENT SYSTEM FOR SANITARY TOILETS

Fig. 1.

INVENTOR
ISAAC E. ASH

ATTORNEY
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Isaac E. Ash, Athens, Ohio

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1. This invention relates to plumbing systems and, more particularly, to apparatus for venting a sanitary toilet.

In the typical installation on which this invention is intended to improve, a toilet is placed relatively close to a large vertical drain pipe. In addition, one or more other fixtures, such as a lavatory and bath tub, are connected to the large drain pipe through a smaller pipe which includes a trap to prevent escape of sewer gas back through the fixture and into the bathroom. Unless preventive measures are taken, the relatively large slugs of water flushed down the large drain pipe will siphon off the water in the trap, thereby unsealing it and allowing sewer gas to escape. Ordinarily, the large drain pipe is continued upwardly as a stack which generally extends through the roof of the building from the point of connection with the toilet drain so as to vent the system to the atmosphere. The object of this invention is to eliminate the stack.

More particularly, it is now proposed to provide, instead of a stack, a vent pipe which extends from the large drain pipe, at the front of connection with the toilet drain, into the flush tank or reservoir of the toilet, and to provide simple, though efficacious means for preventing escape of sewer gas through the bath tub and lavatory. In connection with this latter objective, it is noteworthy that, in the case of any given toilet, the only time the large drain pipe needs venting to prevent siphoning off of the trap water is immediately after the toilet has been flushed and, coincidentally, at the time the water in the reservoir is approaching its lowermost level. Accordingly, it is now proposed to utilize the rise and fall of the water in the toilet reservoir for sealing and unsealing the vent pipe at the strategic times.

The manner of accomplishing the above objectives will be apparent from the following specification and drawing in which: Fig. 1 is a side elevation, partially broken away to illustrate one embodiment of the invention; and, Fig. 2 is a front elevation, partially broken away, illustrating a second embodiment of the invention.

Referring now to the drawings, in which like reference numerals denote similar elements and in which prime numerals are utilized to denote elements in the second embodiment analogous to those of the first embodiment previously described, a toilet indicated generally at 2, conventionally, includes a bowl 4 in which drains at 6 through a pipe 8 usually in floor 9 which, in turn, is connected at 10 to a large drain pipe 14 in wall 15. Flush water is supplied to bowl 4 from a reservoir 16 via a connection not shown. Ordinarily, large drain pipe 14 is vented to the atmosphere by a stack 18, shown in dash lines, which extends upwardly from union 19 in wall 15.

In the illustration all details of toilet 2 not essential to the understanding of the invention have been omitted, it being understood that water is supplied to reservoir 16 so that it ordinarily stands at level A and that there is a valve and, usually, a float system within reservoir 16 controlled by flush handle 20 so that, when handle 23 is operated, water discharges from reservoir 16 into bowl 4 until the reservoir water reaches the level B shown in dotted lines. Thereafter the valve in the bottom of reservoir 16 closes, and water is supplied to reservoir 16 until it regains level A.

Also shown in the drawing is a lavatory 17 connected through a small drain pipe 19 and trap 21 to large drain pipe 14. Heretofore, unless a stack 18 was provided, the large slugs of water flushed from toilet 2 down large drain pipe 14 would siphon off the water in trap 21, thus leaving an open connection between pipe 14 and the interior of the bathroom for the escape of sewer gas.

The invention concerns a vent pipe 22 which, instead of stack 18, connects with large drain pipe 14 preferably at the union 19, and extends upwardly, and thence into reservoir 16 at a point substantially at level A, and thence downwardly, by a bend 24. The open lower end 25 of pipe 22 terminates one to three inches above lower level B of the reservoir water. Upon operation of handle 20, water flushes from reservoir 16 to bowl 4 and out via drain pipe 6 and the pipe 8 to large drain pipe 14. When this water first starts out drain pipe 6, no venting is yet necessary. Up to this phase of the cycle, venting via pipe 22 is prevented because the lower end 26 of pipe 22 is still under water in the reservoir.

Then, as the reservoir water recedes to within about three inches of level B, at which time the flushing operation is nearly over, the lower end 26 of pipe 22 becomes unmasked, and a vent between main drain pipe 14 and the atmosphere within reservoir 16 is established, thus preventing siphoning of the last water in the pipe 8 by the slug of water passing down main drain pipe 14. By the time the reservoir water level has climbed from B back up to open end 26 of vent pipe 22, the slug of flush water will have passed down through main drain pipe 14 so that venting is no longer needed. The extension of pipe
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22 above the top level A of the reservoir water, of course, prevents gravitational flow of water out through vent pipe 22.

It is apparent that the invention can be applied to systems wherein the reservoir is disposed at locations other than near the toilet bowl, that vent pipe 22 can be connected to the main drain pipe at locations other than at the union shown, and, as shown in Fig. 2, that pipe 22' may extend upwardly from the main drain pipe through the bottom of reservoir 16', so long as lower end 28' extends downwardly into the reservoir water to a point slightly above the lowermost level. Ordinarily, the leakage of air into reservoir 16 is sufficient to supply the needs for venting but, if desired, a suitable air inlet may be provided at the top of the reservoir.

With each flushing of the toilet 2, a complete charge of fresh air will be drawn into the large drain pipe 14 through vent pipe 22, thereby eliminating any collection of gases within the drain pipe or at the base of the toilet. By the same action, gases or stagnant air will be kept away from the smaller pipes and traps connecting the large drain pipe and other fixtures.

The invention is intended to cover all modifications and equivalents within the scope of the following claims.

I claim:

1. In a sanitary toilet system including a toilet bowl, a reservoir for supplying water to the bowl, a main drain pipe, and an outlet connecting the bowl and main drain pipe wherein, in the flushing cycle of the toilet the water in the reservoir recedes from an upper level to a lower level and subsequently returns to the upper level, and another fixture connected to the main drain pipe through a trap the improvement which comprises a vent pipe which extends from said main drain pipe to a point substantially even with said upper level and thence downwardly in the reservoir to an open end slightly above said lower level.

2. In a plumbing system including a toilet reservoir, the improvement which comprises a vent pipe having a downwardly extending portion with an open lower end, said portion extending downwardly in said reservoir from a level substantially even with the level of water in said reservoir when the latter is full to a point slightly above the level of water in said reservoir when the toilet is flushed, and means for connecting the upper portion of said pipe to a main drain pipe.

3. In a plumbing system including a toilet bowl, a reservoir thereof, and means for connecting said bowl to a main drain pipe, the improvement which comprises a continuously closed vent pipe having a first portion extending upwardly through said reservoir to a point at least as high, substantially, as the water level of said reservoir when the latter is full, a substantially 180° neck connected to the top of said first portion, a second portion extending downwardly from said neck in said reservoir to an open lower end slightly above the lowermost water level of said reservoir when the latter is flushed, and means for connecting said first portion to said main drain pipe.

4. A vent for a toilet having a reservoir and a bowl adapted to be connected to a main drain pipe, comprising a continuous pipe having a first portion with an end disposed at least slightly above the uppermost level of water in said reservoir, a second portion extending downwardly in the reservoir from said first portion to a point adjacent but slightly above the lowermost level of water in said reservoir, and means for connecting the first portion to said main drain pipe.

ISAAC E. ASH.

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