Oct. 22, 1963 L. M. YOUNG 3,107,682

VENTILATING SYSTEM

Filed May 8, 1961

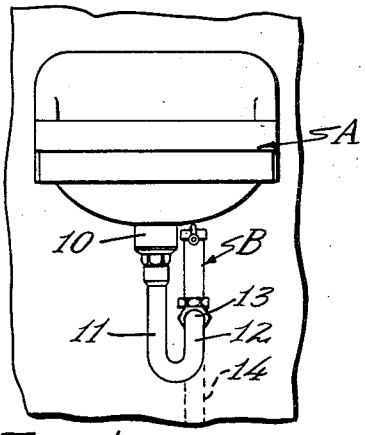


FIG. 1

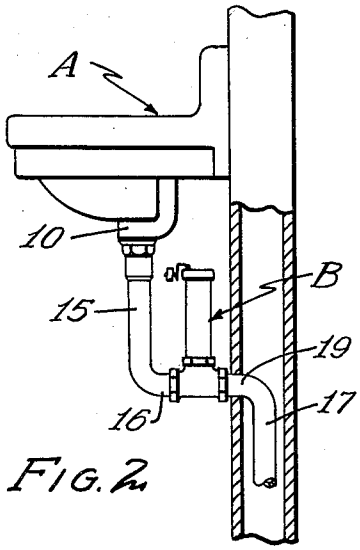


FIG. 2

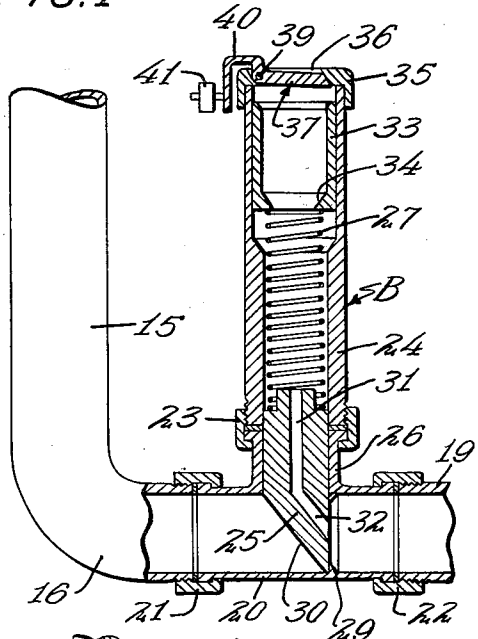


FIG. 3

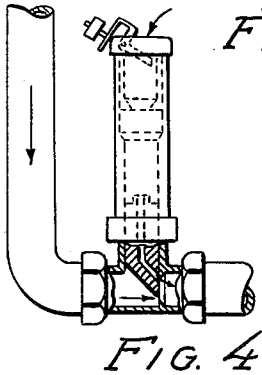


FIG. 4

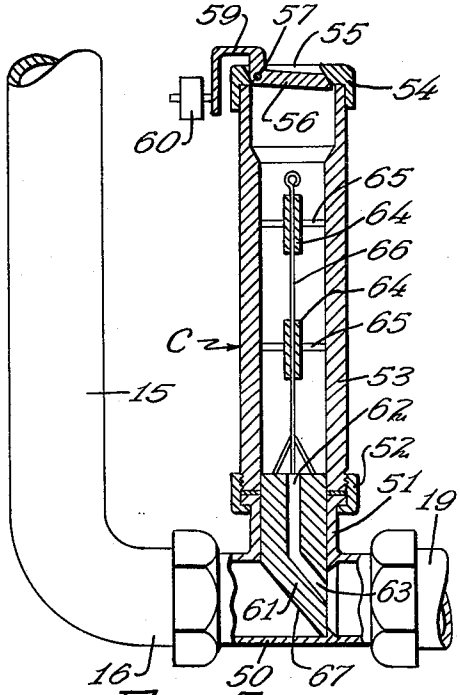


FIG. 5

INVENTOR

Lyle M. Young

BY Robert M. Dunning

ATTORNEY

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VENTILATING SYSTEM

Lyle M. Young, 1807 W. Minnehaha, St. Paul, Minn.

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The invention relates to an improvement in ventilating system for use in conjunction with drain traps, and deals particularly with an apparatus designed to eliminate the requirement for an external vent on household plumbing.

In household plumbing, an external vent is normally required to prevent the return flow of gases and liquids, and also to prevent the liquid from being trapped in the drain by the creation of a partial vacuum in the drain line. It is an object of the present invention to provide a valve arrangement which is employed in the drain line, and which closes the drain line against a return flow of liquid or gas. At the same time, the valve arrangement prevents the trapping of fluid in the drain by permitting air to enter the drain, and by preventing the flow of gas or liquid in the opposite direction.

A feature of the present invention resides in the provision of a valve in the drain line from a sink or other such fixture which normally closes the drain line to the sewer or cesspool, but which automatically opens when water drains from the fixture toward the sewer or cesspool. As a result, the valve acts in the manner of a check valve to permit the liquid to flow in one direction only, thereby preventing the return flow of liquids or fluids.

A further feature of the present invention resides in the provision of a flutter valve which acts in conjunction with the valve in the drain line, and which permits a flow of air into the drain to prevent the creation of a partial vacuum in the drain line. This flutter valve is balanced in a manner somewhat similar to a draft damper used in conjunction with a furnace, so that as the liquid passes through the drain line, causing a partial vacuum in the drain line, the flutter valve will swing open to permit the entrance of air into the drain line, thus permitting the complete drainage of the line.

These and other objects and novel features of the present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification,

FIGURE 1 is a front elevational view of a sink or similar fixture showing the vent valve used in conjunction with an S-type trap.

FIGURE 2 is a side elevational view of a sink or similar fixture showing the valve used in conjunction with a drain pipe not incorporating an S-type water trap.

FIGURE 3 is an enlarged sectional view through the valve which may be used with either type of trap.

FIGURE 4 is a side elevational view of the construction shown in FIGURE 3, a portion of the parts being broken away to show the arrangement thereof.

FIGURE 5 is a vertical sectional view through a modified form of trap construction.

In the particular arrangement illustrated, the vent valve arrangement is used in conjunction with a lavatory or sink A. Obviously, the valve could be used with other fixtures which require a drain.

In FIGURE 1 of the drawings, the sink A is provided with a drain connection 10 which is connected in the usual manner to a J-shaped drain pipe 11 which is designed to provide a water trap in the drain line. As is usual practice, the short outlet end 12 of the J-shaped pipe 11 includes a generally horizontally extending end portion 13 which in turn is connected through the tubular base portion of the valve B to the downwardly extending drain line 14.

In FIGURE 2 of the drawings, the sink drain outlet 10 is connected to an L-shaped pipe 15, the lower end

16 of which is bent to extend in a generally horizontal direction. As in FIGURE 1, the lower end 16 of the pipe 15 is connected through the tubular base portion of the valve B to the downwardly extending drain pipe 17 which is provided with a horizontally extending upper end portion 19 which is attached to the valve.

In FIGURES 3–5 of the drawings, the valve is shown connected to the type of sink drain illustrated in FIGURE 2 of the drawings. Obviously, the figures could similarly show the valve B used in conjunction with the water trap type of drain illustrated in FIGURE 1.

As is best indicated in FIGURE 3 of the drawings, the valve B includes an inverted T-shaped coupling 20 which is connected at opposite ends by coupling rings 21, 22, or other suitable means, to the ends 16 and 19 of the pipes 15 and 17 respectively. The leg of the T-shaped coupling body extends upwardly and is secured by a coupling ring 23 or other suitable means to the tubular body 24. A valve plunger 25 is slidably supported in the leg of the T, which is indicated by the numeral 26, the valve plunger being urged downwardly by means of a light spring 27. The valve body is preferably provided with a valve seat 29 against which the lower end of the valve may engage, although this seat is not an essential part of the apparatus. The lower extremity of the valve plunger is cut on an angle as indicated at 30, and the lower end of the plunger is also rounded to seat against the lower surface of the T-shaped body member 20. As a result, the valve plunger 25 closes the connection between the pipe ends 16 and 19 when the plunger is in lowered position.

The valve plunger 25 is provided with a passage extending therethrough, the passage including a vertical portion 31 and an angularly inclined lower portion 32 which communicates with the downstream portion of the drain line. As a result, the interior of the sleevelike chamber 24 is in communication with the downstream side of the drain line both when the valve is open and also when it is closed. The purpose of this arrangement will be later described.

A spacing sleeve 33 is secured within the tubular body 24 near the upper end thereof, the sleeve 33 including a shoulder 34 at its lower end against which the spring 27 may engage. Alternatively, the upper end of the spring 27 may be held by a transverse pin or any other suitable means.

The upper end of the chamber 24 is provided with a cap 35 having an axial aperture 36 extending therethrough which is of somewhat smaller diameter than the internal diameter of the tubular body 24. A butterfly valve 37 is hingedly connected to the cap 36 by means of a pivot pin 39. The major portion of the butterfly valve lies to the right of the pivot 39 as viewed in the drawings, and an arm 40 is connected to the butterfly valve and extends in an opposite direction from the pivot 39. An adjustable weight 41 is supported by the arm 40, and is of proper size to insure the closing of the butterfly valve 37 when there is no downward draft of air upon this valve. The weight 41, however, does not close the butterfly valve 37 with sufficient force so that it will not be opened when the portion of the chamber 24 beneath the valve is subjected to a partial vacuum.

With this arrangement, the drain opening 10 of the sink A is normally closed from connection with the drain line 14 or 17 by the valve plunger 25. While the tubular valve chamber 24 is in communication with the drains 14 or 17, the upper end of the valve chamber is closed by the butterfly valve 37. Any water in the drain pipe is permitted to drain downwardly, even though the sink drain is closed, by drawing air downwardly past the butterfly valve 37 and through the valve chamber 24. This

air also passes through the passages 31 and 32 in the valve plunger.

When water drains from the sink 10, the valve plunger raises sufficiently to permit the water to escape, compressing the spring 27 to a small extent. The plunger 25 may be opened either by the head of liquid acting against the plunger, or by forming the plunger of materal sufficiently buoyant to move upwardly against the light pressure of the spring 27. As the water flows past the valve, air may be drawn from the valve chamber through the passages 31 and 32. As the water drains past the valve plunger 25, the valve plunger moves down into lowered position to close the connection with the sink drain. The air continues to flow in the drain line 14 or 17 through the passages 31 and 32 and through the valve body. When all of the liquid is drained from the line, the butterfly valve 37 will close to prevent the escape of gases.

The structure shown in FIGURE 5 of the drawings is quite similar to the previously described construction, and operates in much the same way. The valve C which is illustrated in FIGURE 5 of the drawings includes a T-shaped connection 50 which is of similar design to the member 20 shown in FIGURE 3, and which is connected between the horizontally turned end 16 of the pipe 15, and the horizontally extending end 19 of the drain pipe 14 or 17. The leg 51 of the T connection extends upwardly and is connected by a connecting sleeve 52 to the tubular body 53. In general, this tubular body 53 is similar to the valve body 24 of the previously described construction.

A cap 54 is supported at the upper end of the tubular body 53, and is provided with an axial opening 55 extending therethrough, the opening 55 being of slightly smaller diameter than the upper portion of the body 53. A valve 56 is pivotally connected to the cap 54 by a transverse pivot 57. An arm 59 is secured to the valve 56 to pivot therewith, and an adjustable counterweight 60 is arranged to normally hold the valve 56. The valve is so balanced that when the pressure on the top of the valve exceeds the pressure within the tubular chamber 53, the valve will open to permit the flow of air downwardly into the body of the valve.

A valve plunger 61 is slidably supported in the leg 51 of the T, and this valve plunger is similar to the valve plunger 25, and includes a vertical passage 62 having an angularly turned lower end 63 extending therethrough. In order to hold the valve plunger properly aligned in the chamber 53, and to assist in slidably supporting the same, a pair of bearing sleeves 64 are supported by spiders 65 axially positioned in the tubular chamber 53. A guide rod 66 is connected at its lower end to the valve plunger 61 and is slidably supported in the bearing sleeve 64 so that the valve plunger may move upwardly or downwardly when pressure is exerted against the inclined rear face 67 of the valve plunger. In the valve C, the weight of the plunger and the guide rod is sufficient to cause the plunger to be normally closed. However, the valve plunger may be made of material which is buoyant in water so that the buoyancy of the plunger will assist in opening the valve.

The operation of the valve C is similar to that of the valve B, and accordingly is not described in detail.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in ventilating system for use in conjunction with drain traps, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A ventilating system for use with a drain line including a generally T-shaped valve body including a cross member designed for connection at opposite ends into a drain line, the cross member extending generally horizontally and designed to support the stem of the T generally upright, a liquid actuated valve plunger slidably supported in the stem of the T and having an end designed to extend across said cross member of the T and to normally close said cross member, said valve plunger having a passage therethrough providing communication between the portion of the stem at the T above said plunger and the downstream end of said cross member when in said drain line, and a flutter valve normally biased to close the upper end of the stem of the T and operable to open the stem of the T to atmosphere when the atmospheric pressure exceeds the pressure within the stem of the T, said plunger being moved upwardly by water in said drain line.

2. A ventilating system for use with a drain line including a tubular conduit designed for attachment on a generally horizontal axis in a drain line, and a tubular valve chamber communicating with said tubular conduit at its lower end and extending upwardly therefrom, a liquid actuated valve element slidably supported in said valve chamber and normally intersecting said tubular conduit to form a seal between the ends thereof, means providing communication between the downstream end of said conduit and the interior of said valve chamber, said valve chamber including a passage leading to atmosphere, and a flutter valve normally biased to close said passage and being operable by atmospheric pressure to open said passage when said valve chamber is subject to sub-atmospheric pressure, said valve element being operated by the pressure of liquid in said conduit to open said conduit.

3. The structure of claim 2 and in which said valve element is buoyant in liquid.

4. The structure of claim 2 and in which said valve element comprises a plunger having an inclined lower end facing toward the upstream end of said conduit, the flow of liquid producing a force upon said inclined lower end to cause actuation of said valve element.

5. The structure of claim 2 and in which said means providing communication comprises a passage through said valve element.

6. The structure of claim 2 and in which said valve element comprises a plunger having an inclined lower end surface exposed to the upstream end of the conduit, and in which the plunger includes a passage from the downstream side of the plunger end to the upper end thereof forming the means providing communication described.

7. The structure of claim 6 and in which the valve element is buoyant.

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