Nov. 11, 1952 D. T. ROSS 2,617,491

ANTI-BACKFLOW DEVICE

Filed May 10, 1946

FIG. 1.

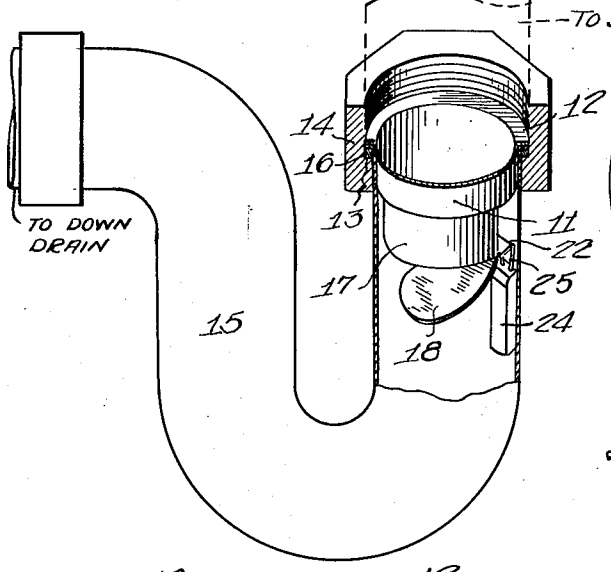

FIG. 3.

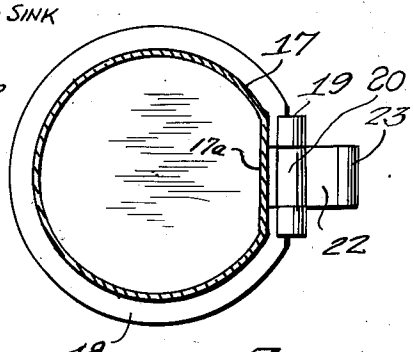

FIG. 4.

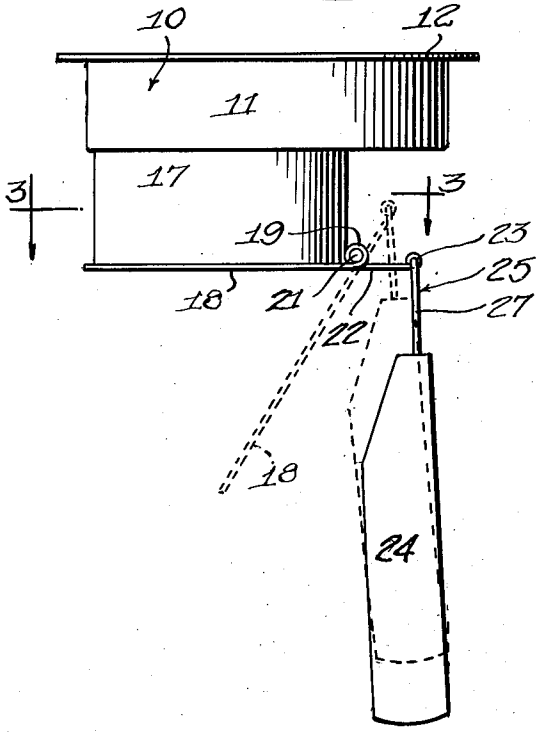

FIG. 2.

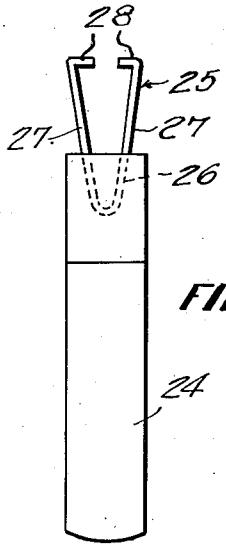

FIG. 5.

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ANTI-BACKFLOW DEVICE

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3 Claims. (Cl. 182—15)

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This invention relates to a device or accessory for installation in the P trap, other outlet or equivalent of a sink in order to prevent the backing-up of water in the sink while permitting free discharge or drainage of water from the latter.

The invention is especially designed for use in apartments or elsewhere having sinks on different floor levels and using the same plumbing, to overcome the objectionable drainage of water from the sinks backing-up in the sink or sinks below the highest one.

It is especially aimed to provide an inexpensive, simple, preferably non-corrodible construction of a few simple parts capable of installation by a novice without the use of special tools.

Another object is to provide such a device as a unit comprising primarily a ring carrying a closure member normally biased to closed position and of such arrangement that it may be disposed in the aforesaid trap, outlet or the equivalent of existing as well as new sink installations.

Various additional objects and advantages will become apparent from a consideration of the description following taken in connection with the drawing illustrating an operative embodiment by way of example.

In said drawings:

Figure 1 is a view partly in perspective and particularly in section showing my improvement in place in a sink trap;

Figure 2 is an enlarged side elevation of the parts constituting the invention;

Figure 3 is a horizontal sectional view taken on the plane of line 3—3 of Figure 2;

Figure 4 is an edge elevation of said closure plate, and

Figure 5 is an elevation of the weight used to bias the closure plate to closed position.

The present invention is designed to meet problems of a particular type. In apartment or tenement houses, where superposed apartments have a common downflow drain pipe leading to an outlet which may be the sewer, each apartment has its plumbing arranged to deliver waste content from individual household fixtures such as toilets, sinks, etc., to such drain pipe to provide desired discharge. The drain pipe is usually dimensioned to take care of a normal expectation of usage of different fixtures from the various apartments which it serves but not for a maximum discharge from all fixtures of all the apartments concurrently. Should the latter condition occur, the drain pipe becomes

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overloaded with consequent backing up of discharge within the pipe. Such back-up would not generally affect upper apartments but could affect lower ones.

This problem would not be as applicable to discharge from toilets and the like, due to the dimensions of the outlets from these fixtures so that back-flow in the connections would be slower in developing, but in the case of sinks and the like, the condition could be serious, since the connections to these are generally of small diameter, less than two inches, and any material back-up would quickly fill such connections and cause back-flow into the sink.

Conditions involving back-up and back-flow have been encountered in other types of installations, especially sewer and sewer basin construction, and have been met by the use of weighted closures operating on the principles of check-valves, this method of solving the problem having been used for many years. However, in such use the conditions of installation have made it possible to utilize control structures of such type. For instance, the inlets and outlets are of large dimensions, as are the conveying pipes, so that no material difficulty is had in efficiently mounting closures of this type, evidenced by the large variety of structures which have been employed in this service, some of these depending upon the weight of the closure itself, others using a counterweight, etc. The large dimensions enable the installation of a desired form of structure.

In contrast with such installations, the conditions of installing a check-valve structure applicable for service in connection with sinks and the like used in apartments and tenements involves solving a number of problems not encountered in other services. A few of these will be referred to.

The trap, usually of P-type, is generally exposed, located in the vicinity of the sink outlet, being connected to the latter by tubing of short length, and itself of small diameter (generally materially less than two inches), with the tubing of a similar diameter to that of the trap. The opening in the sink is usually of larger diameter, shielded by a removable perforated plate, the sink carrying a chamber of similar dimensions and of small depth below the shielded opening, this chamber opening into a tubular portion leading to the trap and having the diameter of the trap diameter. Obviously, any downwardly opening check-valve structure designed to protect the sink must be located within the portion

of the plumbing intermediate the chamber and the trap outlet, so that the dimensions of the valve assembly are necessarily limited to the internal dimensions of the tubular connection and trap (less than two inches in diameter), must permit of opening downward, must not affect the operation of the trap itself, and must permit the outflow of sink content at such rate that the trap will function efficiently. In addition, due to the fact that the valve must operate within circular tubing and cooperate with a seat formed within the tubular connections, the valve and seat must be sufficiently smaller in diameter than the tubing as to permit the weighted valve to swing pivotally to and from its open condition.

Also, the valve assembly must be located sufficiently remote from the sink opening as to provide a volume of water above the closed valve sufficient not only to open the valve but to produce the pressure needed to place the trap into operation to siphon sink and trap content when the valve is opened. In this connection, the valve must be of such thickness and have such movement as will not provide a venting effect during trap operation by providing an air-filled break during opening of the valve. The weight must be sufficient to normally retain the valve closed but insufficient to close the valve prior to the venting of the siphoning volume in the usual manner after the trap has practically emptied, in order to prevent accumulation of waste within the trap itself.

These conditions are met by the structure disclosed herein and by its mounting within the entrance leg of the trap as shown. This will now be described:

Referring specifically to the drawing wherein like reference characters designate like or similar parts throughout the different views, the invention comprises a generally tubular body 10 made of any desired metal, preferably non-corrosive, plastic or the equivalent, by stamping, casting or otherwise. More specifically, body 10 has an upper ring at 11 equipped with an integral outwardly extending flange 12 at its upper marginal edge which is adapted to seat in a suitable plumbing fixture and be clamped in place so as to position the body operatively as best suggested in Figure 1. As shown, such flange is engaged with the inwardly extending flange 13 of a lower nut 14 used in any conventional or other fitting which attaches a trap such as the P trap 15, or other suitable outlet to a sink. As shown, it is preferable to employ a gasket 16 between the flanges 12 and 13.

The lower portion of the body 10 is reduced or constricted to form an outlet 17 open at the bottom. Such outlet is normally closed by a plate 18 having ears or barrels 19 integral therewith and curled thereon and interfitting on either side of a barrel 20 integral with the marginal edge of outlet 17. A pintle 21 is passed through the barrels 19 and 20 in order to provide a hinge joint on which the closure plate 18 is adapted to swing as suggested by the dotted lines in Figure 2.

Extending radially outward between the barrels 19 is a lug or extension 22 which terminates at its outer end in a curl or barrel 23. A suitable weight 24, preferably elongated, of any suitable material such as lead, is suspended from the barrel 23. To this end, a generally U-shaped hinge 25 may have its lower portion 26 cast or embedded in the weight 24. The remainder of the hinge 25 extends upwardly to form resilient arms 27 terminating in inwardly extending pintle projections 28. The resilience of the arms 27 urges the pintle projections 28 into the position shown in Figure 5 whereby they will be entered in opposite end portions of the barrel 23 and the weight pivotally suspended from the closure plate 18 in order to normally maintain the latter closed as shown in Figure 2.

As shown in Figure 1, the specific assembly thus described is located in the upstanding entrance leg of the P-trap with the flange 12 (and interposed gasket) overlying the entrance end of the leg. Hence, the body 11 and its depending eccentrically-positioned outlet 17, formed of sheet material, together with the plate 18, extension 22 and depending weight structure 24, are all located within the interior of such trap leg, the space for receiving the extension being provided by the eccentric positioning of outlet 17 together with the flattened side wall 17*a* of the outlet from which the material forming barrel 20 projects, this arrangement permitting outlet 17 to be adequate for waste from the sink, plate 18 forming the closure for the outlet with the weight value sufficient to maintain the plate normally in closed position.

While this tends to provide a restricted passageway at the entrance end of the trap, the normal operation of the trap is not materially affected, the only substantial difference in action being that produced by the fact that the closed plate can serve to temporarily prevent the movement of small quantities of waste until the accumulation above the plate is of sufficient weight to overcome weight 24, thus opening the plate to permit escape of the accumulation into the trap, instead of the usual movement of such content directly into the trap. Otherwise the trap operates in the usual manner in the presence of sufficient waste to raise the seal content of the trap into position to begin the siphoning action, plate 18 opening for the action. When the siphon effect is broken, the residue content of the break returns to the legs of the trap to form the trap seal, the surface of which may or may not reach the plate 18. During the siphoning period the plate presumably remains open even after the waste material has passed through the plate seat, due to the flow of air through the open top, the plate seating when the siphon break occurs. Hence, the presence of the specific assembly within the trap itself does not materially affect the normal operation of the trap.

When, however, the overloading of the downflow common drain pipe above referred to causes the back-up or back-flow conditions, the advance of the latter is toward the discharge end of the trap, and, due to the small diameter of the trap, provides a rapid advance therein and moves the seal in the direction of the closed plate 18. Any trapped air between the seal surface and the plate and the projecting portion of the bottom of the body 11 will tend to be compressed by the pressure of the back-flow and thus form a cushion tending to project the plate, the latter being held firmly to its seat by such pressure and making impossible the movement of back-flow content into the extension 22 and the channels thereabove. In other words, back-flow cannot pass beyond the trap itself. When overloading of the drain pipe has been relieved, outflow of the content of the connection between trap and drain pipe will

ensue with a siphoning effect within the trap, the break of which will restore the trap to normal operating conditions, including the control assembly.

From this it will be understood that while the control assembly is of sufficiently small dimensions as to be capable of being located internal of the entrance leg of the trap, it completely satisfies the needs of the conditions previously indicated in detail, and will adequately meet any abnormal conditions such as are presented by overload of the down-flow drain pipe, and serve to prevent the movement of any back-flow waste material into the sink or the connections between sink and trap, this result being obtained without any change in or increase of the trap dimensions, thus permitting application of the control assembly within plumbing previously installed.

Particular attention is called to the fact that the invention consists of simple parts and that it may be installed as an accessory in existing sink constructions and also in new ones, by a novice and without special tools, as well as being capable of manufacture expeditiously and at minimum cost, it being especially noted that all parts below the ring 10 are located and operable within the extended imaginary cylinder thereof.

Various changes may be resorted to provided they fall within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. In assemblies for protecting household sinks and the like against back-flow of waste content and especially from household apartments and in combination, a P-trap within the service outlet of the sink, the vertical entrance leg of the P-trap being of uniform diameter, and a protecting instrumentality mounted at the entrance of the trap of the sink outlet and extending into the vertical entrance leg of such trap, said instrumentality including an annular open-top element having a lower annular outlet portion in open communication with such element open top, said outlet portion being of reduced diameter with its lower end forming a valve seat, said portion being positioned eccentric to the axis of the element to thereby provide a restricted space between the exterior of the annular portion and the adjacent trap wall, said element and its outlet portion being formed of sheet material, and a planar valve for the outlet pivotally carried by said portion and having an extension projected in the direction of such space, said extension carrying a depending weight pivotally secured thereto to thereby normally retain the valve seated, said valve being openable by waste content flow from the sink in the direction of the trap and retained closed in presence of content moving from the trap in the direction of the sink, said extension being movable into and out of the restricted space during opening and closing movements of the valve.

2. An assembly as in claim 1 wherein the annular wall of the reduced portion of the element of the instrumentality includes a flattened zone facing the restricted space with the pivotal connection between valve and element positioned in the vicinity of the lower edge of said zone and by pintle and barrel formations with the barrels located above the top plane of the valve and formed from both structures, said valve body being relatively thin in its thickness dimension with the extension and body integral and with the outer end of the extension formed into an open-ended barrel formation also located above the plane of the top of the valve, and said weight being of elongated type with reduced cross-sectional width and provided with a pair of fingers anchored in the weight and positionable respectively in the open ends of the barrel formation to serve as a pivotal mounting for the weight to permit free vertical movement of the weight without affecting freedom of movement of waste content into and through the trap.

3. A check valve for use in an upwardly ranging plumbing fixture drain pipe comprising, a cylindrical tubular body having one end provided with an outwardly extending flange adapted to rest on and support the body within the upper end of a drain pipe, the other end terminating in a short cylindrical tubular portion forming an outlet opening, the opening being of smaller area than the body and positioned eccentrically with respect to the latter, a flap valve hingedly connected with the lower edge of the tubular portion in position to close the outlet opening, the hinge pivot being positioned at the point where the wall of the eccentrically spaced outlet opening is nearest the center of the cylindrical tubular body, the flap valve having a portion extending outwardly beyond the hinge pivot forming a lever, said lever terminating in a loop, the lever and loop being within the area of the cylindrical tubular body, and means for normally urging the valve toward closing position, comprising a weight supported from the loop at the end of the lever.

DEWEY T. ROSS.

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