# United States Patent [19]

**Oberholtzer**

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[54] **SEWAGE BACKWATER RELIEF VENT**


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[51] **Int. Cl.** ..... **E03f 5/08**

[58] **Field of Search** ..... 4/1, 136, 129, 133, 106, 4/216–221, 286, DIG. 7, 287, 293, 295; 138/89; 137/236, 247.11



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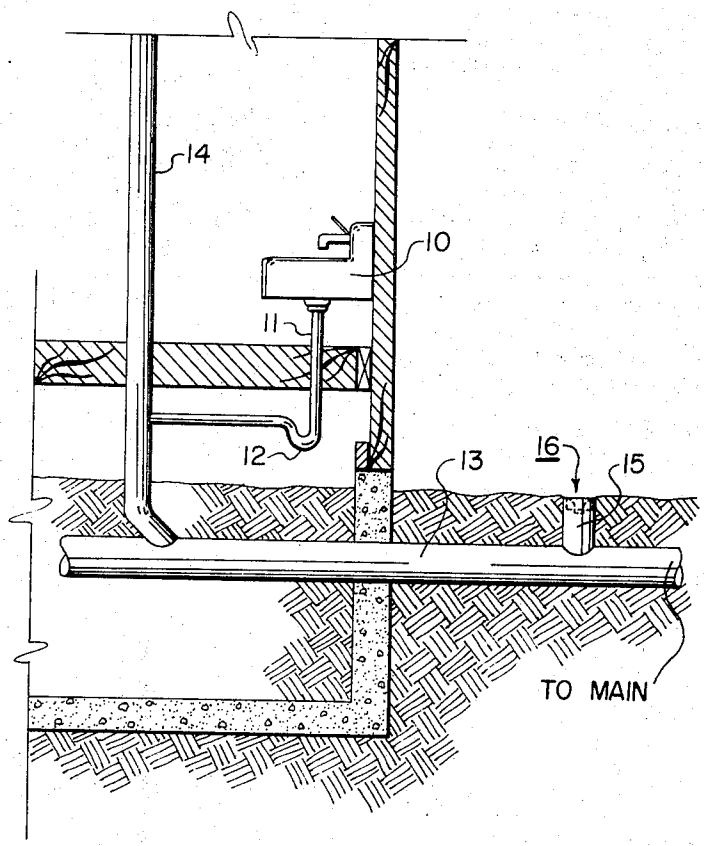
[57] **ABSTRACT**

Disclosed is a household sewage collection system employing a backwater relief vent. The relief vent is an externally threaded cylindrical body adapted to replace the clean-out plug and has a centrally located aperture. The aperture is closed with a non-threaded plug which prevents the escape of sewer gas but is unseated by back pressure exerted thereon to vent any backwater fluid at ground level and thus prevent backwater from rising to the level of the sewer receptacles.


**4 Claims, 3 Drawing Figures**



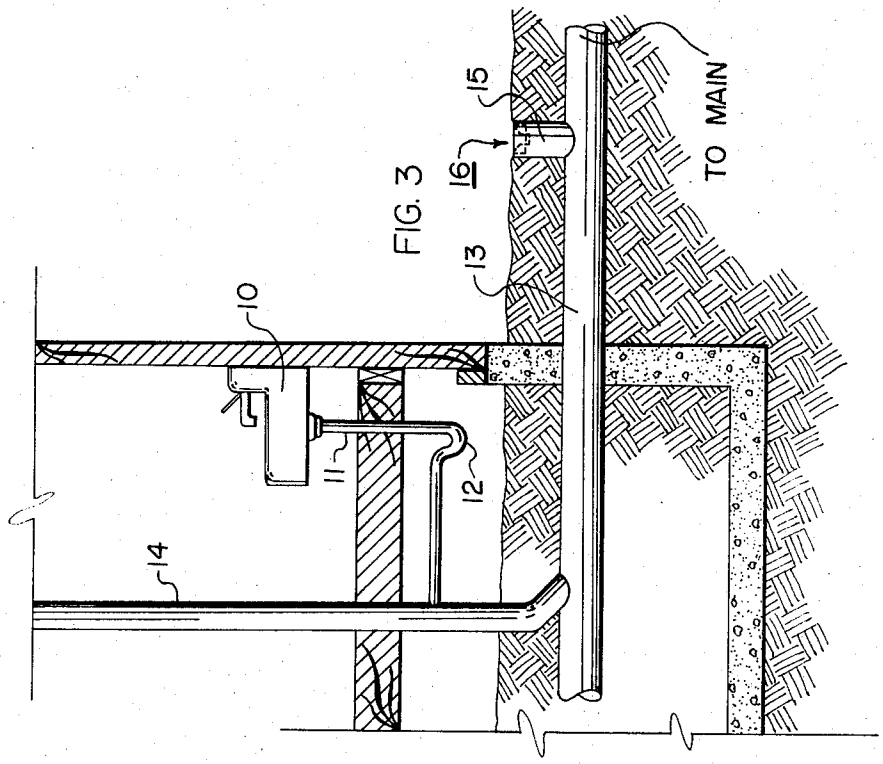



FIG. 3

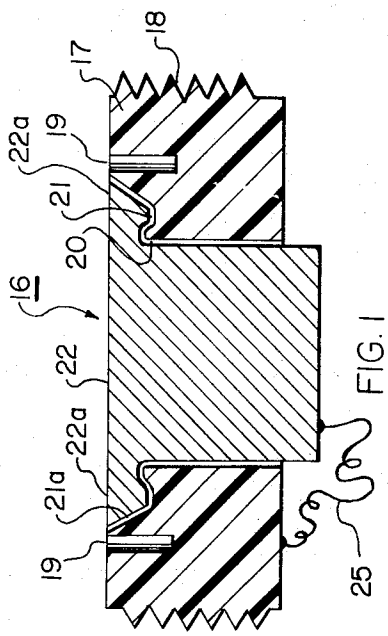



FIG. 1

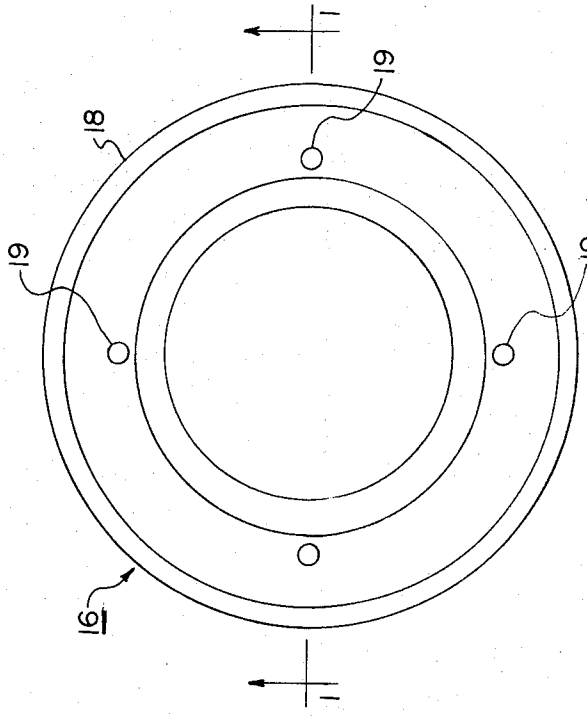



FIG. 2

# SEWAGE BACKWATER RELIEF VENT

This invention relates to sewer system relief vents. More particularly it relates to systems and apparatus for venting backwater from sewer collection systems and preventing backwater from overflowing through household sewer receptacles.

Conventional sewage disposal systems for ordinary household use comprise a plurality of sewage and sewage water receptacles, such as bathtubs, lavatories, sinks and the like, which drain by gravity into a common sewage collection line which then in turn feeds directly into a sewer main. Each of the individual sewage receptacles ordinarily employs a conventional S-trap to prevent sewer gas from escaping from the sewer system into the receptacle.

Sewer water feeds by gravity from each of the receptacles into the collection line and to the sewer main. Accordingly, the only pressure exerted on the sewage system at any point between the collection point and injection into the sewer main is the weight of the flowing water. Conventionally there is a vertical vent pipe installed between the traps and the sewer main to prevent sewer gas from backing through the traps and to insure that the sewer system is maintained at atmospheric pressures. The conventional sewer system as described above also ordinarily includes a conventional clean-out port in the collection line to provide access to the sewer collection system so that the system may be mechanically cleaned if accidentally plugged.

Since the individual sewage collection system and the sewer main rely on gravity feed for flow of sewage water away from the collection point, blockage or overloading of the sewer main can produce devastating results. For example, if the sewer main is blocked downstream from the collection system sewage in the main from upstream sources will be diverted to the collection systems nearest to the blockage and flow backward through the individual traps and into the sewage receptacles.

Previous attempts to prevent such backwater flooding commonly take the form of backwater traps which, in essence, are one-way valves between the sewer collection points and the interconnection between the collection system and the main. Accordingly, such traps allow sewage to flow only in the direction of the main and prevent back flow from the main into the collection system. Unfortunately such backwater traps are not totally effective and, since they are usually mechanical, are subject to deterioration and themselves increase the likelihood of blockage of the collection system. Furthermore, if the main is clogged and the backwater valve closed, no vent is provided to relieve collection of sewage in the individual collection systems. Thus sewage will be vented by gravity through the lowest receptacle in the household system and cause it to overflow.

In accordance with the present invention a vent is provided which is designed to replace the plug ordinarily used to cap the clean-out port provided in conventional sewage collection systems. The relief vent of the invention is designed to be positioned at or near ground level, thus below the lowest receptacle in the collection system. The vent is opened by the pressure of backwater alone to prevent any backwater from rising above ground level between the receptacles and the sewer main. Accordingly, any backwater diverted to the collection line from the main line will be vented through the relief vent of the invention before entering the household system. Likewise, if the household collection system is plugged between the clean-out port and the main, all sewage and water from the collection system will be vented at ground level and will not be allowed to backup to the level of the lowest receptacle. Accordingly, the vent plug of the invention prevents any possibility of backwater being diverted from the main into the household system and also prevents the flooding of the household system through the lowest receptacle if the collection system is plugged. The vent may be conveniently inserted as a replacement for the plug in a conventional clean-out port. It is also automatically activated without providing a potential blockage hazard to the system itself.



Other advantages and features of the invention will become more readily understood when taken in connection with the appended claims and attached drawings in which:

FIG. 1 is a sectional view of the preferred embodiment of the relief vent of the invention;

FIG. 2 is a top plan view of the relief vent of FIG. 1; and

FIG. 3 is a schematic illustration of a conventional household sewage collection system employing the relief vent of the invention.

A conventional household sewage collection system is partially illustrated in FIG. 3. The conventional system usually comprises a plurality of sewage collection receptacles such as a lavatory **10.** Effluent from the lavatory drains by gravity through a drain line **11,** trap **12** and into a sewage collection line **13.** Other sewage collection sources (not illustrated) also feed into sewage collection line **13.** An open line **14** provides a vent from the collection line **13** to atmosphere. The vent **14** is usually a vertical pipe open at the top above or near the upper level of the housing structure. The purpose of vent **14** is to allow the escape of sewer gas from the collection line **13** and to insure that gas pressure in collection line **13** remains at atmospheric.

The sewage collection line **13** provides means to conduct the sewage collected from the various receptacles into a sewer main. The collection line **13** is at or below ground level and drains by gravity toward the main.

The ordinary collection system also includes a clean-out port **15** at or near ground level between the sewage collection receptacles and the main line. The purpose of the clean-out port is to provide easy access to the collection line **13** for mechanical cleaning when necessary. Ordinarily clean-out port **15** is closed with a threaded plug which can be mechanically removed to allow access to the sewer system.

In accordance with the present invention the conventional plug in clean-out port **15** is replaced by a relief vent plug. The relief vent plug of this invention is illustrated at **16** in FIGS. **1** and **2.**

The vent plug **16** comprises a cylindrical body **17** threaded on its vertical exterior surface with conventional male pipe threads **18** to mate with the conventional female threads in the conventional clean-out port **15.** The top surface of the body **17** is flat but is provided with a plurality of indentures **19** adapted to mate with the tongs of a conventional sewer plug wrench for screwing plug **16** into and out of a conventional clean-out port.

A centrally located cylindrical aperture **20** passes vertically through the body **17** concentric with the exterior vertical surface thereof. In the preferred embodiment the body **17** includes a groove **21** on the top surface which has outwardly sloping outer surfaces **21***a* concentric with the aperture **20** as illustrated in FIG. **1.** It will be observed that the major portion of the wall of the aperture **20** is vertical and concentric with the exterior walls of the body. The top of the aperture, however, is expanded to join groove **21** below the level of the top surface of the body **17.**

A plug **22,** having external dimensions conforming to the internal dimensions of aperture **20** and groove **21,** is positioned within the aperture **20** and groove **21** as illustrated in FIG. **1.** The plug **22** preferably mates with the groove **21** and aperture **20** to provide an easily removably sliding plug which is not bound in the aperture. However, the expanded portion **22***a* of plug **22** rests in groove **21** and provides a gas tight seal merely by the weight of the plug **22** resting on the walls **21***a* and bottom of groove **21.** In the preferred embodiment the lower end of plug **22** extends slightly below the lower surface of the plug body.

The entire vent plug as illustrated in FIGS. **1** and **2** is preferably constructed of a durable but lightweight material such as plastic or the like. The material of the plug should preferably be formed of a non-corrosive non-oxidizable material so that the plug **22** does not become bound in the aperture **20.** Furthermore, as illustrated in FIG. **1,** the top surface of plug **22** is preferably co-planar with the top surface of the cylindrical body **17.**

If desired, flexible retaining means such as a line **25** may be attached to the plug **22** and to the body **17** to prevent loss of the plug during installation or use. The line **25** should be of sufficient length to permit plug **22** to be completely removed from the aperture **20.**

In use the assembly of FIG. **1** is substituted for the conventional clean-out port plug as illustrated in FIG. **3.** It will be observed that when placed in a vertical position in the clean-out port **15** in an otherwise conventional system, the plug **22** is retained within the system merely by gravity but provides an effective gas seal by the weight of the plug **22** being supported by the sides and bottom of groove **21.** In normal use sewer water does not rise in the clean-out port **15** and the relief vent plug is not affected. However, if the collection line **13** becomes plugged downstream from the clean-out port or if the sewer main becomes overloaded or plugged downstream from the junction of the collection line **13** and the sewer main, sewer water will accumulate within the collection line **13.** As the amount of sewer water increases the level thereof will rise at equal levels in all receptacle lines and the vent **14.** As the sewage water rises a hydrostatic head of pressure builds up in the collection system. Since the clean-out port is located at or near ground level and below the level of the lowest receptacle, the hydrostatic pressure will be exerted against the relief plug **22.** When the pressure becomes greater than the weight of plug **22,** plug **22** will be elevated off its seat and allow the sewer water to escape through the aperture **20.** Since plug **22** is retained within aperture **20** merely by its own weight, the hydrostatic pressure allowed to build up in the collection line **13** need only be sufficient to lift the weight of plug **22.** Furthermore, since the clean-out port is at ground level (below the level of any sewage receptacle within the household system), sufficient hydrostatic pressure will accumulate in line **13** to remove plug **22** from the aperture **20** before the sewage water reaches the level of any receptacle. Accordingly, all fluid accumulating in the collection system above the level of the clean-out port **15** will be vented through the aperture **20.**

It should be noted that after the blockage is relieved the plug **22** need merely be replaced within the aperture **20** and the system is again in normal working condition. It should be also noted that the relief vent disclosed replaces the cap plug in a conventional clean-out port. The vent plug may, of course, be removed as desired to provide access for mechanical clean-out purposes in the conventional manner.

While the invention has been disclosed with reference to a household sewage system, it will be readily appreciated that the system may be employed in any single or multi-family dwelling as well as in commercial establishments. Furthermore, the relief vent plug of the invention can be constructed quite inexpensively and substituted for the plug cap in a conventional clean-out port. Therefore, very little expense or labor is required to provide the advantages of the invention in an otherwise conventional system.

Although the invention has been described with particular reference to a specific embodiment thereof, it is to be understood that the form of the invention shown and described is to be taken as the preferred embodiment of same, and that various changes and modifications may be resorted to without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

**1.** A relief vent and plug comprising:

a. a first cylindrical body with male threads on the vertical exterior surface thereof and having a centrally located aperture passing vertically therethrough; and

b. a second cylindrical body removeably positioned within said aperture substantially sealing said aperture and retained therein only by gravitational force exerted on said second cylindrical body;

wherein the bottom portion of said aperture is substantially cylindrical and the top portion thereof is expanded to form a recessed groove in the top face of said first cylindrical body concentric with said cylindrical portion of said aperture, and the external surface of said second cylindrical body is conformed to mate with the surfaces of said aperture.

**2.** The relief vent and plug defined in claim **1** wherein the plane of the top surface of said second cylindrical body is substantially coplanar with the plane of the top surface of said first cylindrical body and the lower end of said second cylindrical body extends below the plane of the bottom surface of said first cylindrical body.

**3.** The relief vent and plug defined in claim **1** including flexible means interconnecting said first cylindrical body and said second cylindrical body, said flexible means being of sufficient length to permit said second cylindrical body to be completely removed from said aperture.

**4.** In combination:

a. a plurality of sewage collection receptacles;

b. a sewage collection line in fluid communication with each of said receptacles and with a sewer main;

c. a clean-out port in said sewage collection line below the level of the lowest receptacle and between the receptacles and said sewer main; and

d. a relief vent plug closing said clean-out port, said relief vent plug comprising:

i. a first cylindrical body with male threads on the vertical exterior surface thereof and having a centrally located aperture passing vertically therethrough; and

ii. a second cylindrical body removeably positioned within said aperture substantially sealing said aperture and retained therein only by gravitational force exerted on said second cylindrical body.

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