

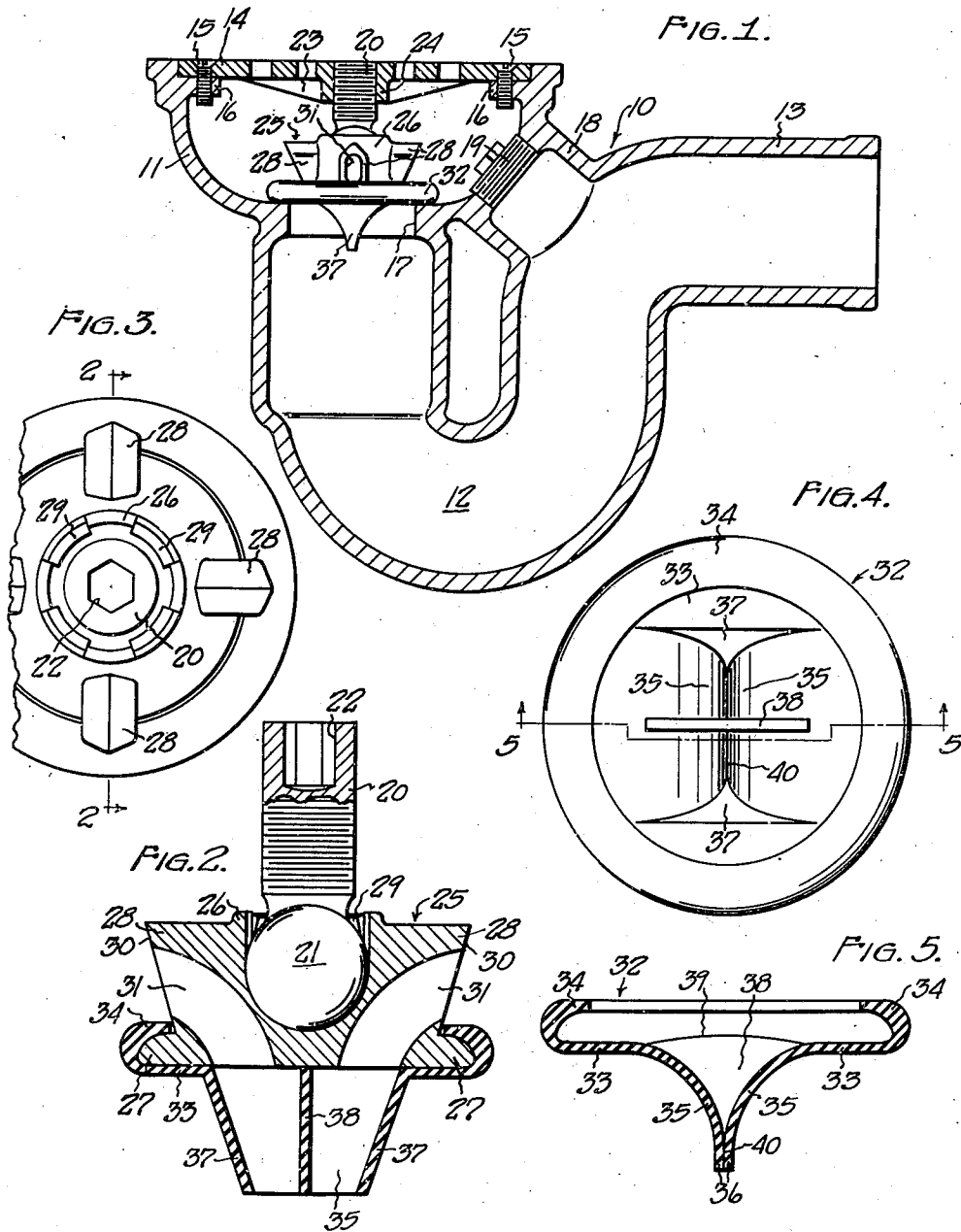
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VALVED FLOOR DRAIN

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VALVED FLOOR DRAIN

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11 Claims. (Cl. 277-55)

This invention relates to valved floor drains.

A number of requirements must be met by a valved floor drain to be fully satisfactory. These requirements arise under different operative conditions. Thus a device must be operative to seal a floor drain against backwater in a sewer, and also against sewer gases. It must be adjustable easily between sealing and draining positions. And it must provide for drainage therethrough when sealed, as upon breaking of a water pipe or accidental leakage or overflow of water from a plumbing fixture in the basement or other room in the floor of which the drain is located. I am aware that valved drains now available on the market provide for one or more of these conditions, but none meet all of these requirements.

The primary object of this invention is to provide a valved floor drain which meets all of the requirements enumerated above.

A further object is to provide a device of this character having a flexible sealing element which can be attached to and detached from a mounting or body member easily, quickly and simply.

A further object is to provide a device of this character having an apertured valve body member mounting a flexible sealing member having a normally closed opening adapted to be opened by application of pressure thereto in one only of two opposite directions.

A further object is to provide a valve member having passages therethrough which is shaped at the mouths of said passages to substantially prevent accumulation thereof of fibrous material which might produce clogging of said passages.

A further object is to provide a novel yielding sealing member adapted to be mounted on an apertured valve body member.

Other objects will be apparent from the description, drawing and appended claims.

In the drawing:

Fig. 1 is a sectional view of a floor drain having my improved sealing valve applied thereto.

Fig. 2 is a vertical sectional view of my improved valve assembly, taken on line 2-2 of Fig. 3.

Fig. 3 is a fragmentary top plan view of the valve assembly.

Fig. 4 is a top plan view of the flexible sealing element.

Fig. 5 is a sectional view of the flexible sealing element taken on line 5-5 of Fig. 4.

Referring to the drawing, which illustrates the preferred embodiment of the invention, the numeral 10 designates one type of conventional floor drain comprising a bowl 11, a trap 12, and an out-

let 13. The bowl is closed by an apertured cover plate 14 supported on a circumferential interior shoulder of the bowl. For the purpose of this invention, cover plate 14 is fixedly secured to the bowl by means of screws 15 having threaded engagement with screw threaded openings formed in ears 16 projecting horizontally within the bowl. The drain is preferably provided with a restricted opening 17 between the bottom of bowl 11 and the intake end of trap 12. An access passage 18 may extend between bowl 11 and outlet 13, and is normally closed by a plug 19 screw threaded therein.

The cover plate 14 has a central screw threaded aperture formed therein to receive a screw threaded shaft 20. Shaft 20 is preferably provided with an enlarged part-spherical end portion 21 at its lower end, and its upper end is provided with an axial configured socket 22 adapted to receive a suitable tool for rotating the shaft. The cover plate may be provided with radial reinforcing ribs 23 and a depending internally screw threaded sleeve or collar 24 to insure a rigid construction and a firm operative threaded inter-engagement between said plate and the shaft.

A valve body member 25 is carried by the lower end of shaft 20. Body member 25 is preferably a brass casting having a central socket portion 26, an enlarged circular plate or flange portion 27 at its bottom and a plurality of radial ribs 28 projecting laterally from socket portion 26. The ball portion 21 of shaft 20 fits within socket portion 26, and the upper end of socket portion 26 is radially slit at a plurality of points to define lips 29 between the ribs 28 which may be bent inwardly to form retainers for shaft end 21. This construction provides a ball and socket connection between shaft 20 and valve body member 25. The outer end faces 30 of the radial ribs 28 extend in planes inclining downwardly and inwardly. Passages 31 are formed in the body member open at faces 30 and extending radially inwardly and downwardly through the ribs 28 and base portion 27, and open at the central portion of the bottom face of the valve body.

A resilient sealing member 32 is mounted upon the lower portion 27 of the valve body member 25. The sealing member is preferably formed of a resilient material, such as rubber or synthetic rubber, and is circular in shape. Member 32 has a circular bottom 33, here shown as flat, fitting against the bottom face of valve portion 27. A marginal portion 34 is upwardly return bent from portion 33 to fit around said flanged lower valve body portion 27. The member 32 is

preferably sufficiently flexible and resilient to permit ready application thereof to and removal thereof from valve member 25 by stretching portion 34 thereof to pass around flange 27. At the center of member 32 a pair of integral walls 35 curve downwardly and inwardly from flat wall 33 to terminate in lips 36 which are normally positioned in face engagement. End walls 37 are also formed integrally with member 32 to connect the ends of walls 35, said end wall preferably inclining downwardly and inwardly. The projection defined by walls 35 and 37 is of a size to fit freely within the restricted opening 17 of the trap at the outlet of bowl 11 and is open at its upper end. A central partition 38 extends transversely between and is formed integral with walls 35. The upper edge 39 of wall 38 is preferably slightly convex, and the central portion of said edge projects slightly above the plane of the upper or inner face of flat portion 33 of member 32. In molding the member 32, the lips 36 of walls 35 are preferably formed integral, and lips 36 are then separated by a slit 40 formed by a suitable thin sharp cutting tool, such as a razor blade.

The valve is normally seated or closed, as illustrated in Fig. 1, when used in a basement floor drain where the drainage of water therethrough is required only at infrequent intervals, as when washing the basement or when laundering clothes therein. In this closed condition, shaft 20 is screwed down to press the valve body and the portion 33 of the flexible member 32 tightly against the bottom of bowl 11 around the bowl outlet 17. The resilience of the member 32, coupled with the ball and socket joint between the shaft 20 and valve body 25 provide a tight and effective seal around bowl opening 17. The seal is effective against back pressure of water and of sewer gas in the trap. Therefore, the only possibility of leakage is confined to the slit 40. However, by reason of the concave curvature of walls 35 of member 32 and the provision of central rib 38 thereof, back pressure is ineffective to open slit 40. The central rib 38 plays an important part in effecting the seal at slit 40. The convex curvature of edge 39 of the rib 38 insures a tight fit thereof against the bottom face of the valve body and a slight outward deflection or bulging of walls 35. Consequently, when pressure is applied to the concave faces of walls 35, it is directly sustained by the ribs 38, and the lips 36 remain in engagement and are prevented from separating at slit 40. This accounts for and provides an effective normal seal against back flow of either water or gas from the trap into the bowl of the drain.

A further important advantage of the construction is that the valve will open automatically to permit drainage of water which accidentally accumulates in a basement as upon breakage of a pipe or unnoticed overflow of a basement plumbing fixture. Thus water on the basement floor is free to flow into bowl 11, through valve body passages 31 and into the pocket of member 32 defined by walls 35 and 37. When this water reaches a predetermined maximum head, its pressure will flex walls 35 outwardly to spread lips 36 and open slit 40 to permit drainage through the floor drain. The head of pressure required to open slit 40 depends upon the construction of member 32 and particularly upon the thickness and the flexibility of walls 35. Since this is strictly an emergency feature, I prefer to construct member 32 so that slit 40

will not open until water reaches a head of from two to three inches above the cover plate 14 of the bowl, but this is optional and is mentioned only as illustrative. The important factor, of course, is to insure against unlimited accumulation of water in the basement or against accumulation thereof to a depth or level which might damage the building structure and its contents. It will be understood, of course, that the head of pressure above mentioned required to operate the drain automatically is that permitting under normal conditions. The drain will not operate at that level against back pressures. However, back pressures of sewer gas in a trap generally do not reach appreciable or serious proportions which would greatly increase the head required to start automatic drainage with this device; and leakage of plumbing fixtures when a back pressure of water exists in the drain would obviously have to be dealt with by means other than the floor drain in any case.

The device can be operated to open the drain by simply rotating shaft 20 to raise the valve body 25, as will be obvious.

It will be obvious that the valve structure is applicable to any conventional construction of floor drain, subject only to possible differences in the shape thereof, etc., occasioned by the design of particular floor drains; and that its application to the form illustrated herein is illustrative and not limiting.

I claim:

1. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, comprising a threaded shaft adapted to be adjustably mounted in said passage, a valve body swiveled on said shaft and having a passage therethrough opening at the central portion of the bottom face thereof, and a sealing element engaging the marginal portion of the bottom face of said body and including a central depending resilient portion defining a chamber communicating with said last passage and having a slit therein, the walls of said depending portion on opposite sides of said slit being positioned in engagement to close said slit normally and during application of upwardly directed pressure against said depending portion.

2. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, comprising a threaded shaft adapted to be adjustably mounted in said passage, a valve body rotatably and rockably mounted on said shaft and having a passage therethrough opening at the central portion of the bottom face thereof, and a sealing element carried by said body and engaging the margin of the bottom face thereof, said body having a central depending resilient chambered portion defined in part by a pair of downwardly converging walls terminating in lips normally in sealing face engagement.

3. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, comprising a threaded shaft adapted to be adjustably mounted at one end in said passage and having a part spherical portion at its opposite end, a valve body having a socket portion receiving said part spherical shaft portion, said body having a passage therethrough whose upper end is open at an

upwardly extending face thereof and whose lower end is open at the central portion of the bottom face of said body, and a resilient sealing element carried by said body and including a marginal portion engaging the bottom face of said body and a central off-set slitted portion.

4. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, comprising a threaded shaft adapted to be adjustably mounted in said passage, a valve body having a passage therethrough open at a side wall and at the bottom face thereof, a universal joint connection between said shaft and body, and a resilient sealing element including a marginal portion engaging the bottom face of said body and a depending off-set centrally slitted portion defined in part by a pair of downwardly converging opposite walls.

5. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, a threaded shaft adapted to be adjustably mounted in said passage and having a part spherical lower end, a valve body including a socketed upper portion receiving said spherical portion and a laterally projecting portion having a passage therein open at the outer end face thereof and at the bottom face of said body, and a resilient sealing member carried by said body and including a marginal portion engaging the bottom face of said body and a depending chambered portion communicating with said last passage, said chambered portion having opposed downwardly converging walls and being slitted between said walls.

6. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, a threaded shaft adapted to be adjustably mounted in said passage and having a part spherical lower end, a valve body including a socketed upper end portion receiving said spherical portion and a radial rib having an end face inclined downwardly and inwardly, said body having a passage therethrough whose opposite ends open at said inclined rib end face and at the central portion of the bottom face of said body, and a resilient sealing element having a marginal portion engaging the bottom face of said body and a depending chambered portion communicating with said last passage and centrally slit.

7. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, a threaded shaft adapted to be adjustably mounted in said passage, a valve body, a universal joint connecting said body and shaft, said valve body having an outwardly extending rib with a downwardly

inwardly inclined end face and a lower enlarged circumferential flange, said body having a passage therethrough open at the end face of said rib and at the center of the bottom face of said body, and a resilient sealing element having a marginal upwardly return bent portion fitting around said flange and a central depending slitted chambered portion communicating with said last passage.

8. A valve for use with a floor drain of the type including a bowl having a restricted outlet and an apertured cover secured to said bowl and having a central screw threaded passage, a threaded shaft adapted to be adjustably mounted in said passage, a valve body having an enlarged circumferential flange, a ball and socket connection between said shaft and valve body, said valve body having a passage therethrough open at the central portion of the bottom face thereof, and a resilient sealing element marginally engaging the bottom face of said valve body and detachably anchored around said flange, said sealing element including a central depending portion communicating with said last passage and having a central slit therein.

9. A sealing element adapted to be mounted on an apertured valve body and to be pressed thereby against a valve seat, comprising a substantially flat portion having a return bent marginal portion engageable with said body and a central off-set tapering portion having a slit therein at its tapered end, and an integral member bridging said off-set portion and transverse of said slit, said sealing element being formed from resilient material.

10. A sealing element adapted to be mounted on an apertured valve body having a flat bottom face and an enlarged flange at its lower end, comprising a body of thin resilient material including a flat portion engaging the margin of the bottom face of said body, a return bent marginal portion fitting around said flange, a central depending off-set defined by a pair of end walls and a pair of opposed converging side walls terminating in face engagement at their lower ends, and a bridge member extending transversely between said side walls and having a portion of its upper edge projecting slightly above the plane of the inner face of said flat portion.

11. A sealing element adapted to be mounted on an apertured valve body and to be pressed thereby against a valve seat, comprising a body formed of thin resilient material and including a valve-seat-engaging marginal portion adapted to be mounted in face engagement with said valve body and a central depending chambered portion, said last named portion having end walls, opposed converging curved side walls having concave outer faces and terminal lips in face engagement, and an intermediate transverse wall bridging said side walls and having a convex upper edge projecting above the marginal portion.

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