

A DRAIN PLUG

TECHNICAL FIELD

- 5 The present disclosure relates to a drain plug, particularly but not exclusively, for use in a floor trap.

BACKGROUND

- 10 A drain plug usually has a grating and when used with a floor trap pipe, the grating allows water to enter the floor trap pipe but prevents relatively large particles from entering the floor trap pipe which may otherwise choke the floor trap pipe. However, such known drain plugs are not effective in keeping out bad odour coming out from floor trap pipes. Further, such known drain plugs may not be easy to maintain.

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It is an object of this invention to address at least one of the disadvantages of the prior art and/or to provide the public with a useful choice.

SUMMARY

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- According to a first aspect of the present invention, there is provided a drain plug, comprising: (i) a trap holder comprising: (a) a holder opening; (b) a discharge outlet; and (c) a reservoir comprising an inner reservoir portion configured to define the discharge outlet, a reservoir base and an outer reservoir portion; (ii) a cover element comprising: (a) a canopy member; and (b) a cover edge extending from the canopy member and into the reservoir; the cover element being arranged to direct liquid received from the holder opening to the reservoir for holding liquid; and (iii) a discharge channel for discharging overflow liquid from the reservoir to the discharge outlet, the discharge channel being disposed further away from the reservoir base than the cover edge of the cover element.

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- The drain plug in the described embodiment may be used in a floor trap and may form a liquid seal in the reservoir which may be useful to prevent odour and small insects/pests from coming through the floor trap. With the cover element received within the trap holder, the drain plug may be configured to fit almost any standard floor trap so that the installation of such drain plug does not require modification of an existing floor trap. The reservoir may be filled with detergent, oil or any other suitable substance to prevent mosquito from breeding in stagnant water stored in the reservoir, or where the reservoir is filled with water, the water may be
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refreshed to prevent mosquito from breeding. With a simple structure, the drain plug is easy to maintain, may not damage easily and hence may have a long service life.

5 Preferably, the cover element may be removably received within the trap holder. This arrangement may render it easy and convenient to maintain the drain plug.

10 Preferably, the cover element may further comprise a grating element configured to occlude the holder opening. The grating element thus blocks relatively large particles from entering the floor trap pipe and may prevent the floor trap pipe from being choked. In a specific embodiment, the grating element has a concave shape.

The cover element may further comprise a handle arranged to protrude from the grating element, for ease of handling.

15 In a specific embodiment, the trap holder includes a holder peripheral wall, and the outer reservoir portion forms at least part of the holder peripheral wall. It is also envisaged that the reservoir may be formed by a separate component and in this case, the outer reservoir portion may be attached to the holder peripheral wall.

20 The trap holder may further comprise a flange extending radially outwardly from the holder peripheral wall. Specifically, the holder peripheral wall may comprise a truncated inverted cone portion connected to the flange.

25 Preferably, the drain plug may comprise one or more spacers arranged to space the canopy member from the inner reservoir portion. With this arrangement, the discharge channel is defined by the inner reservoir portion cooperating with the one or more spacers.

30 Alternatively, it is envisaged that the discharge channel may be defined by one or more openings in the inner reservoir portion.

It is envisaged that features relating to one aspect may be applicable to other aspects.

BRIEF DESCRIPTION OF THE DRAWINGS

35 In the following, exemplary embodiments of the present invention including the figures will be described as non-limiting examples with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a drain plug comprising a trap holder and a cover element received within the trap holder, according to a preferred embodiment of the present invention;

FIG. 2 is a perspective view of the trap holder of FIG. 1;

FIG. 3 is an enlarged perspective view of the cover element of FIG. 1;

FIG. 4 is a top view of the drain plug of FIG. 1, with the cover element placed next to the trap holder to illustrate a reservoir of the trap holder;

FIG. 5 is the drain plug of FIG. 4 with but with the reservoir filled with water or other liquid illustrated as shaded area;

FIG. 6 is a side view of the drain plug of FIG. 1, with the cover element placed next to the trap holder;

FIG. 7 is a vertical cross-sectional view of the drain plug of FIG. 1, with the cover element being received within the trap holder;

FIG. 8 depicts the drain plug of FIG. 7 with the reservoir filled with water or other liquid illustrated as shaded area, similar to FIG. 5;

FIG. 9 is a perspective view of the drain plug of FIG. 1, with the cover element being lifted up from the trap holder; and

FIG. 10 is a vertical cross-sectional view of the drain plug of FIG. 9.

DETAILED DESCRIPTION

FIG. 1 is a perspective view of a drain plug 100 comprising a trap holder 102 and a cover element 104, according to a preferred embodiment of the present invention. The cover element 104 is arranged to be received within the trap holder 102. The trap holder 102 comprises a flange 106, a holder opening 108 surrounded by the flange 106, a connecting portion 110 and a body 112 defining a holder peripheral wall. The connecting portion 110 has a truncated inverted cone and connects the flange 106 to the body 112. The body 112 and thus, the holder peripheral wall is of a generally cylindrical shape. The flange 106 extends radially outwardly from the holder peripheral wall defining the connecting portion 110.

The cover element 104 comprises a grating element 114 and a handle 116 disposed on top of and near a center of the cover element 104. The grating element 114 comprises a plurality of grating openings 118 to filter or block relatively large particles from entering.

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FIG. 2 is a perspective view of the trap holder 102 of FIG. 1 without the cover element 104. FIG. 3 is an enlarged perspective view of the cover element 104 of FIG. 1 which comprises a canopy member 122, a cover peripheral wall 124 extending from the canopy member 122 and includes a cover edge 126.

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FIG. 4 is a top view of the drain plug 100 of FIG. 1, with the cover element 104 placed next to the trap holder 102. The top view shows that the trap holder 102 further comprises a reservoir base 128, an inner reservoir portion 130 and a discharge outlet 132. In this embodiment, the body 112 or the holder peripheral wall forms an outer reservoir portion and together with the reservoir base 128 and the inner reservoir portion 130 define a reservoir 134 for storing or holding water or other liquid. The inner reservoir portion 130 is configured to define the discharge outlet 132. As illustrated in FIG. 4, the trap holder 102 further comprises four spacers 120, spaced apart along and attached to the inner reservoir portion 130. The spacers 120 are arranged to support the canopy member 122 of the cover element 104 and space the canopy member 122 from the inner reservoir portion 130, when the cover element 104 is received within the trap holder 102. The top view of the cover element 104 shows that a vertical projected area of the grating element 114 is larger than a vertical projected area of the canopy member 122.

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FIG. 5 illustrated the drain plug 100 of FIG. 4, and which shows the reservoir 134 filled with liquid (illustrated as shaded area).

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FIG. 6 depicts side views of the cover element 104 and the trap holder 102 placed side by side. The side views show that the grating element 114 has a concave shape, with edges of the grating element 114 extending outwardly. The handle 116 extends upwardly from the canopy member 122 through a central area of the grating element 114. The handle 116 may be used by a user to hold the cover element 104, to place the cover element 104 into the trap holder 102 or remove the cover element 104 from the trap holder 102. FIG. 6 shows a height of the cover element 104 is lower than a height of the body 112 of the trap holder 102.

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FIG. 7 is a vertical cross-sectional view of the drain plug 100 of FIG. 1, with the cover element 104 received within the trap holder 102. The spacers 120 extend upwardly from the reservoir

base 128 with the inner reservoir portion 130 also extending from the reservoir base 128. The spacers 120 have a height higher than a height of the inner reservoir portion 130, spacing the cover edge 126 from the reservoir base 128 and the canopy member 122 from the inner reservoir portion 130. In this way, the spacers 120 create gaps between an upper edge 136 of the inner reservoir portion 130 and top portions of the spacers 120 to define a discharge channel 138 for discharging overflow liquid from the reservoir 134 to the discharge outlet 132.

As it can be appreciated from FIG. 7, after the cover element 104 is mounted to the trap holder 102, the cover edge 126 of the cover element 104 extends further from the canopy member 122 than the discharge channels 138 into the reservoir 134, but spaced from the reservoir base 128. Or from another perspective, the discharge channels 138 are further away from the reservoir base 128 than the cover edge 126. The discharge channels 138 are disposed within a circumference of the cover edge 126 of the cover element 104. A reservoir space of the reservoir 134 is divided by the cover edge 126 into two areas, and the two areas are fluidically connected with each other. The canopy member 122 and the cover peripheral wall 124 of the cover element 104 direct a liquid received from the holder opening 108 into the reservoir space of the reservoir 134 outside the cover edge 126 of the cover element 104, the liquid may then flow into the reservoir space of the reservoir 134 within the cover edge 126 of the cover element 104. After the reservoir space of the reservoir 134 is filled with liquid, overflow liquid from the reservoir 134 is discharged through the discharge channels 138 to the discharge outlet 132. The plurality of grating openings 118 of the grating element 114 allow liquid received from the holder opening 108 to pass through, but blocks solid objects with a size bigger than a size of the grating openings 118 from passing through. The grating element 114 and the body 112 are cooperatively configured, so that when the cover element 104 is received within the trap holder 102 the gap between the grating element 114 and the body 112 is minimal. The body 112 defines a space suitable for receiving the cover element 104. Being configured in a shape of truncated inverted cone, the connecting portion 110 defines a space that is wider than the space defined by the body 112. It does not affect outer shape of the trap holder 102 when the cover element 104 is received within the trap holder 102. Since the drain plug 100 is suitable for fitting to any standard floor trap and there is no requirements to modify existing floor traps. The flange 106 has an upward surface 140 and a downward surface 142. The downward surface 142 is configured to have four concentric grooves. After the trap holder 102 is inserted into a floor trap (not shown in the drawing), the flange 106 sits on an edge of the floor trap with the downward surface 142 engaging the edge of the floor trap. Configuring groove arrangement on the downward surface 142 of the flange 106 increases friction between the flange 106 and the edge of the floor trap.

FIG. 8 is a vertical cross-sectional view of the drain plug 100 of FIG. 1, with the cover element 104 received within the trap holder 102 and with the reservoir 134 filled with water or other liquid as illustrated as shaded area. A height of the reservoir space of the reservoir 134 defined by the body 112, the reservoir base 128 and the inner reservoir portion 130 is subject to the lowest point of the inner reservoir portion 130. When the reservoir space of the reservoir 134 is filled with liquid, a liquid level 144 corresponds to the lowest point of the inner reservoir portion 130. As the cover edge 126 of the cover element 104 extends into the reservoir space of the reservoir 134, the liquid level 144 covering the cover edge 126 forms a liquid seal. The liquid seal prevents odour and small insects/pests from coming through the floor trap. Arrows B and C illustrate directions of airflow passing through the discharge channels 138, but blocked by the liquid seal, the cover peripheral wall 124 and the canopy member 122. Arrows D illustrate a direction of airflow being blocked by the canopy member 122. Airflow from any direction below the canopy member 122 of the cover element 104 is blocked from coming through the canopy member 122.

A user may insert a hand into the trap holder 102 through the holder opening 108 and hold the handle 116.

To use the drain plug 100 in a floor trap, the trap holder 102 of the drain plug 100 is inserted into the floor trap pipe, with the flange 106 arranged to sit on an edge of the floor trap and water or other liquid may flow into the drain plug 100 from the holder opening 108 in the direction of arrow A (see FIG. 1). The cover element 104 may be inserted into the trap holder 102 and placed onto the spacers 120 before or after the trap holder 102 is inserted into the floor trap pipe. When a liquid (such as water) flows into the floor trap, the liquid enters the holder opening 108, passes through the grating element 114 and then flows into the reservoir space of the reservoir 134. As the two areas of the reservoir space of the reservoir 134 divided by the cover edge 126 are fluidically connected with each other, the liquid then flows into the area of the reservoir space of the reservoir 134 within the cover edge 126. If the amount of liquid is not enough to fill up the reservoir space of the reservoir 134, then the liquid will be stored or held in the reservoir 134. If the amount of liquid is more than enough to fill up the reservoir space of the reservoir 134, overflow liquid is discharged from the discharge channels 138 to the discharge outlet 132. Once the liquid level 144 covers the cover edge 126 of the cover element 104, a liquid seal is formed, preventing odour and small insects/pests from coming through the floor trap.

During use of the drain plug 100, for maintenance or any other purposes, the cover element 104 may be lifted up or decoupled from the trap holder 102. FIG. 9 is a perspective view of

the drain plug 100 of FIG. 1, with the cover element 104 being lifted up from the trap holder 102 in the direction of arrow E. FIG. 10 is a vertical cross-sectional view of the drain plug 100 of FIG. 1, with the cover element 104 being lifted up from the trap holder 102 in the direction of arrow E. By decoupling the cover element 104 from the trap holder 102, it is easy and convenient to clean the cover element 104 and the trap holder 102 separately. If there is a blockage in the drain plug 100, decoupling the cover element 104 from the trap holder 102 would also make it easy to dredge the drain plug 100. If the cover element 104 or the trap holder 102 is damaged, only the damage part is needed to be replaced. Further, during use of the drain plug 100, a user may choose to pour detergent, oil or any other suitable substance in the reservoir 134 to prevent mosquito from breeding in stagnant water stored in the reservoir 134.

The drain plug 100 in the preferred embodiment may be used in almost any standard floor trap and the liquid seal formed in the reservoir 134 prevents odour and small insects/pests from coming through the floor trap when in use. As the drain plug 100 is configured to fit almost any standard floor trap, the installation of such drain plug 100 does not require modification of existing floor trap. A user may choose to pour detergent, oil or any other suitable substance into the reservoir 134 to prevent mosquito from breeding in stagnant water stored in the reservoir 134. With a simple structure, the drain plug 100 may always work and not easily break down or spoil, hence may have a long service life. As the cover element 104 may be removed from the trap holder 102, the drain plug 100 may be capable of easy maintenance. With the handle 116 being disposed on top of the cover element 104, it is easy for a user to hold the cover element 104 to place the cover element 104 in the trap holder 102 and remove the cover element 104 from the trap holder 102; this may be further improved by configuring the connecting portion 110 in a shape of truncated inverted cone. With the grating element 114, the cover element 104 may filter liquid received from the holder opening 108, preventing blockage in the floor trap pipe. With the flange 106, the need of adhesives or drilling may be avoided when installing the drain plug 100.

The described embodiment should not be construed as limitative. In the described preferred embodiment, the cover edge 126 is spaced from the reservoir base 128, which allows liquid directed into the reservoir space of the reservoir 134 outside the cover edge 126 to flow to the reservoir space of the reservoir 134 within the cover edge 126. In a possible variation, the cover edge 126 may not be spaced from the reservoir base 128, and instead, the cover peripheral wall 124 is configured to comprise one or more openings to fluidically connect the two areas of the reservoir space of the reservoir 134, and the longest distance between the or each opening and the reservoir base 128 is shorter than a distance between the upper edge

136 and the reservoir base 128. Or from another perspective, the or all openings of the peripheral wall 124 is/are further away from the canopy member 122 than the discharge channels 138. The one or more openings allow liquid directed into an area of the reservoir space of the reservoir 134 outside the cover edge 126 to flow into an area of the reservoir space of the reservoir 134 within the cover edge 126.

In the described embodiment, the inner reservoir portion 130 is in the form of an upstanding wall but this may not be necessary and the inner reservoir portion 130 may simply be used to define the discharge outlet 132. Also, the reservoir base 128 may not be planar and may be slanted or slope with respect to a horizontal plane. Indeed, various configurations to form the reservoir 134 are envisaged. Indeed, the reservoir 134 may be defined by a separate container and attached to the body 112 of the trap holder 102.

In the above described preferred embodiment, the cover element 104 is removably received in the trap holder 102. In an alternative embodiment, the cover element 104 and the trap holder 102 are integrally formed.

The drain plug 100 in the above described preferred embodiment comprises four spacers 120, and each discharge channel 138 is defined by two neighboring spacers 120 together with the upper edge 136 of the inner reservoir portion 130. It should be appreciated that the drain plug 100 may comprise other number of spacers 120, such as zero, one, two or more, and the discharge channels 138 may be defined in other manners. In an alternative embodiment, the drain plug 100 does not comprise any spacer (zero spacers), the cover element 104 may be inserted into the trap holder 102 and placed onto the inner reservoir portion 130, a discharge channel 138 is defined by configuring an upper edge of a portion of the inner reservoir portion 130 to not be leveled to an upper edge of another portion of the inner reservoir portion 130. In an alternative embodiment, one or more discharge channels 138 is/are defined by configuring one or more openings in the inner reservoir portion 130. In another alternative embodiment, the drain plug 100 comprises one spacer 120, the spacer 120 is formed with sufficient width and length for supporting the cover element 104; the spacer 120 and an upper edge of the inner reservoir portion 130 define the discharge channel 138 within the cover edge 126 of the cover element 104. In another alternative embodiment, one or more spacers 120 extend from the canopy member 122 of the cover element 104 rather than from the reservoir base 128 of the trap holder 102; the one or more spacers 120 extending from the canopy member 122 together with the inner reservoir portion 130 of the reservoir 134 define one or more discharge channels 138 within the cover edge 126 of the canopy member 122.

In the above described preferred embodiment, the canopy member 122 has a cone shape. In an alternative embodiment, the canopy member 122 may have a shape of a plane plate.

5 In the above described preferred embodiment, one section of the holder peripheral wall is configured to define the connecting portion 110. In an alternative embodiment, the whole of a holder peripheral wall may be configured to define the body 112 of the trap holder 102, without defining any connecting portion; and the flange 106 extends radially outwardly from the holder peripheral wall.

10 In the above described preferred embodiment, the drain plug 100 sits on the edge of the floor trap using the flange 106. In an alternative embodiment, the trap holder 102 may not have the flange 106 may engage a floor trap through any common means suitable for engaging the trap holder 102 to the floor trap.

15 In the above described preferred embodiment, the grating element 114 has a concave shape and the grating element 114 is disposed on top of the canopy member 122. In an alternative embodiment, the cover element 104 comprising the grating element 114 may have a planar shape, and not concave. In another alternative embodiment, the grating element 114 extends radially outwardly from the cover peripheral wall 124 of the cover element 104. In another
20 alternative embodiment, the cover element 104 may not comprise the grating element 114 and instead, water simply flows directly onto the canopy member 122.

As FIG. 6 shows, in the above described preferred embodiment, the height of the cover element 104 is lower than the height of the body 112 of the trap holder 102. It should be
25 appreciated that the cover element 104 may have a height equal to or higher than the height of the body 112 of the trap holder 102. For example, the handle 116 of the cover element 104 may extend into the space defined by the connecting portion 110.

It is envisaged that the drain plugs described above may find applications in any
30 circumstances with a pipe, such as in a floor trap, drainage pipe or the like.

The terms 'comprise', 'comprises' and 'comprising' when used in this description or the appended claims should not be construed in an exclusive or exhaustive sense but rather in an inclusive sense. Thus the expression 'comprising' as used herein does not exclude the
35 presence of other elements or steps in addition to those listed in any claim. Furthermore, the words 'a' and 'an' shall not be construed as limited to 'only one', but instead are used to mean 'at least one', and do not exclude a plurality. Features that are not specifically or explicitly

described or claimed may be additionally included in the invention within its scope. The use of expressions like "preferably" is not intended to limit the invention. "First" and "second" are used to merely identify two parts from each other and does not serve to provide any meaning of the parts being identified, so that a part can be identified as a first part or a second part or the like and such identification per se does not limit the part. Features described in different exemplary embodiments may be interchanged wherever applicable. Additions, deletions, and modifications within the purview of the skilled person may generally be made without departing from the spirit and scope of the invention, as is determined by the claims.

CLAIMS

1. A drain plug, comprising:
 - (i) a trap holder comprising:
 - (a) a holder opening;
 - (b) a discharge outlet; and
 - (c) a reservoir comprising an inner reservoir portion configured to define the discharge outlet, a reservoir base and an outer reservoir portion;
 - (ii) a cover element comprising:
 - (a) a canopy member; and
 - (b) a cover edge extending from the canopy member and into the reservoir; the cover element being arranged to direct liquid received from the holder opening to the reservoir for holding liquid; and
 - (iii) a discharge channel for discharging overflow liquid from the reservoir to the discharge outlet, the discharge channel being disposed further away from the reservoir base than the cover edge of the cover element.
2. The drain plug according to claim 1, wherein the cover element is removably received within the trap holder.
3. The drain plug according to claim 1 or 2, wherein the cover element further comprises a grating element configured to occlude the holder opening.
4. The drain plug according to claim 4, wherein the grating element has a concave shape.
5. The drain plug according to any preceding claim, wherein the cover element further comprises a handle arranged to protrude from the grating element.
6. The drain plug according to any preceding claim, wherein the trap holder includes a holder peripheral wall, and the outer reservoir portion forms at least part of the holder peripheral wall.
7. The drain plug according to claim 6, wherein the trap holder further comprises a flange extending radially outwardly from the holder peripheral wall.
8. The drain plug according to claim 7, wherein the holder peripheral wall comprises truncated inverted cone portion connected to the flange.

9. The drain plug according to any preceding claim, further comprising one or more spacers arranged to space the canopy member from the inner reservoir portion.
10. The drain plug according to claim 8, wherein the discharge channel is defined by the inner reservoir portion cooperating with the one or more spacers.
11. The drain plug according to any of claims 1 to 9, wherein the discharge channel is defined by one or more openings in the inner reservoir portion.