

DESCRIPTION
IMPROVED LIQUID VALVE

The present invention relates to a valve for a liquid drain. More specifically the invention relates to a valve which prevents insects, animals, smells etc. from emerging into domestic premises through drains.

There are many instances in households where drains are used to discharge liquid, usually water, from sinks or bathtubs or from floors of certain areas which get wet. For instance there may be drains in the floors of bathrooms or kitchens etc. Usually trap reservoirs of water are provided in U-shaped parts of the drain close to the plug or drain holes. These reservoirs prevent foul air escaping from the pipes through the plug or drain hole and into the house.

Such reservoirs do not, however, prevent certain pests or insects, for instance cockroaches, from crawling up the drains. These insects are able to pass through the reservoirs and enter the rooms or sinks etc., through the plug or drain holes. Such reservoirs can also provide breeding grounds for insects, such as mosquitos, if they are not used for any length of time and become stagnant. Such pests as breed in the reservoirs or pass through them can be both a nuisance to the inhabitants of the house and hazardous to health.

These problems are not just confined to houses but to other premises, for instance leisure, industrial and commercial premises or drains to almost any enclosed space. It is an object of the invention to allay these problems, at least partially, and preferably to prevent pests, insects and smells from passing through drainpipes out through the drain and/or plug holes.

The present invention provides a method of selectively sealing a liquid drain using a valve element to seal the drain by occupying a valve aperture and to unseal the drain to allow throughflow of liquid by being given a buoyancy by the liquid to float above the aperture.

According to the present invention there is provided a valve for a liquid drain, comprising a body for fitting into the drain and having a drain aperture, and a buoyant



valve element movable, by its own buoyancy in liquid flowing through the body, from a rest position in which it seals the drain aperture to an open position thereby opening the drain aperture.

Preferably there are means to prevent the valve element escaping from the body. The drain aperture may be circular. The valve element may be spherical.

In another aspect of the invention there is provided a drain in which a valve as mentioned above is fitted.

In order that the present invention may be more readily understood the following description is given, merely by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of component parts of an embodiment of the invention;

Figure 2 is a cross-sectional view of the embodiment of Figure 1 when installed; and

Figure 3 is a similar view to that of Figure 2, during flow of water.

Figure 1 shows a first embodiment of the present invention. In this embodiment the liquid valve consists of three components: a main body 2, a valve ball 4, and a lid 6. As can be seen in Figure 2, during use, the valve ball 4 sits loosely in the main body 2. The ball 4 is prevented from escaping from the main body by the lid 6.

The main body comprises a hollow cylinder which is open at one end and converges at the other end 10 to a circular hole 8 which is symmetrical about the centre of axis of the main body.

The lid 6 may sit either loosely or tightly in the main body 2. It may be sealed on or detachably attached for example by clips or a screw thread, screwing onto or into the main body 2.

In use, as can be seen from Figures 2 and 3, the valve is placed into a drain pipe 12 in the floor. The pipe already has an entrance rim 14 with a grating 16 of elongate, circular or other shaped holes. The main body should preferably fit exactly into the pipe to prevent escape of pests or smells from between it and the pipe. The main body fits within the rim 14 with the valve lid 6 sitting on a ledge. The main body is situated with



the converging end 10 lowermost and the hole 8 provides a seat for the valve ball 4. Normally the valve ball 4, under the action of gravity, seals the hole 8 preventing free movement within the drain of air, insects, or small amounts of liquid.

The valve can be placed almost anywhere in the pipe but preferably within the upper part of the drain immediately beneath the plug or drain hole. The lid 6 also has a grating to allow liquid to pass through it freely. The valve can be placed such that the lid 6 can be almost immediately adjacent the grating 16 of the plug or drain hole itself.

Water which passes through the floor grating passes into the main body 2 of the valve. It passes the sides of the loose-fitting ball collecting in the converging end 10. When

sufficient liquid has accumulated in the converging end 10 above the valve seat 8, the valve ball 4 will have sufficient buoyancy to float up away from the hole 8, thereby allowing liquid to flow out from the main body through the lower hole 8. This is shown in Figure 3 where the volume of liquid entering the main body is sufficient to float the valve ball 4 above the hole 8. As the flow of liquid into the main body stops, the remaining liquid flows out until there is an insufficient amount to provide buoyancy to the ball, in which case it reseals the hole 8.

Thus the only time the hole 8 is unsealed is when there is liquid flow through the drain hole and down through the drain. Otherwise the drain is sealed. If the main body 2 overflows the valve ball 4 is prevented from floating away by the lid 6.

Typically the body 2 and lid 6 may be made from PVC or almost any other type of mouldable plastic, or even metal or ceramics. The parts may be of different materials if preferred.

Similarly the valve ball 4 can be made of almost any material, for instance Stavax (Trade Mark). It may be solid or hollow but must be of sufficient weight to prevent insects from pushing it aside in order to crawl up through the main body. On the other hand it cannot be too heavy so that it does not float without the main body 2 being totally full. Its average density must be sufficient for it to float in water.

To prevent stagnation of the liquid remaining in the lower end 10 of the main body 2 it is possible to provide means to allow all the liquid to be removed. Preferably,



there are one or more gaps between the valve ball 4 and valve seat 8. These might be in that the order of 1mm or less across to allow any remaining liquid in the lower end 10 of the main body 2 to escape. Alternatively, the lower part of the main body 2 may have areas of a very fine gauze, or cloth etc. around the seat or in other holes.

Not only does this invention prevent the breeding of mosquitos in the traps and the entrance of cockroaches or other insects into the house but also provides an alternative means for controlling the escape of foul air through the drains and can be used to reduce it.

All the components may be of different shapes to those illustrated, for instance the main body may be square in cross section or of a conical profile and/or the valve ball may also be conical. Nor is it necessary for the valve to be situated in vertical or near-vertical pipes. Valves according to the invention could be used in almost any pipe through which a flow of liquid is intended. Further, the lid may be replaced with other means to prevent the ball from "escaping" such as protrusions, restraining wire, etc.





CLAIMS

1. A valve for a liquid drain, comprising a body for fitting into the drain and having a drain aperture, and a buoyant valve element movable, by its own buoyancy in liquid flowing through the body, from a rest position in which it seals the drain aperture to an open position thereby opening the drain aperture.
2. A valve according to claim 1 further comprising means to prevent said valve element passing out from said body.
3. A valve according to claim 1 or 2 wherein said second aperture is circular, and said valve element is adapted to provide a circular plug of the same size to plug said second aperture.
4. A valve according to claim 3 wherein said valve element is spherical.
5. A valve according to any one of the preceding claims wherein said main body comprises a portion which is a hollow cylinder.
6. A valve according to any one of the preceding claims wherein, in use, said valve element is biased towards its rest position by the force of gravity.
7. A valve according to any one of the preceding claims wherein walls of the body slope towards the drain aperture.
8. A drain having fitted therein a valve according to any one of the preceding claims.
9. A valve substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.



ABSTRACT
IMPROVED LIQUID VALVE

A liquid control valve consisting of a main body 2 with a valve seat 8, a valve ball 4 and a lid 6. This is installed at the top of a drain 12, particularly a floor drain. During use the valve ball 4 sits in the valve seat 8 preventing insects from climbing up through the drain 12 into the premises. when liquid flows down through the drain the ball 4 is lifted up by the buoyancy of the liquid to allow the liquid to flow through the valve seat 8. Once the liquid has drained away the valve ball 4 settles back down to seal the seat 8.

Fig. 3

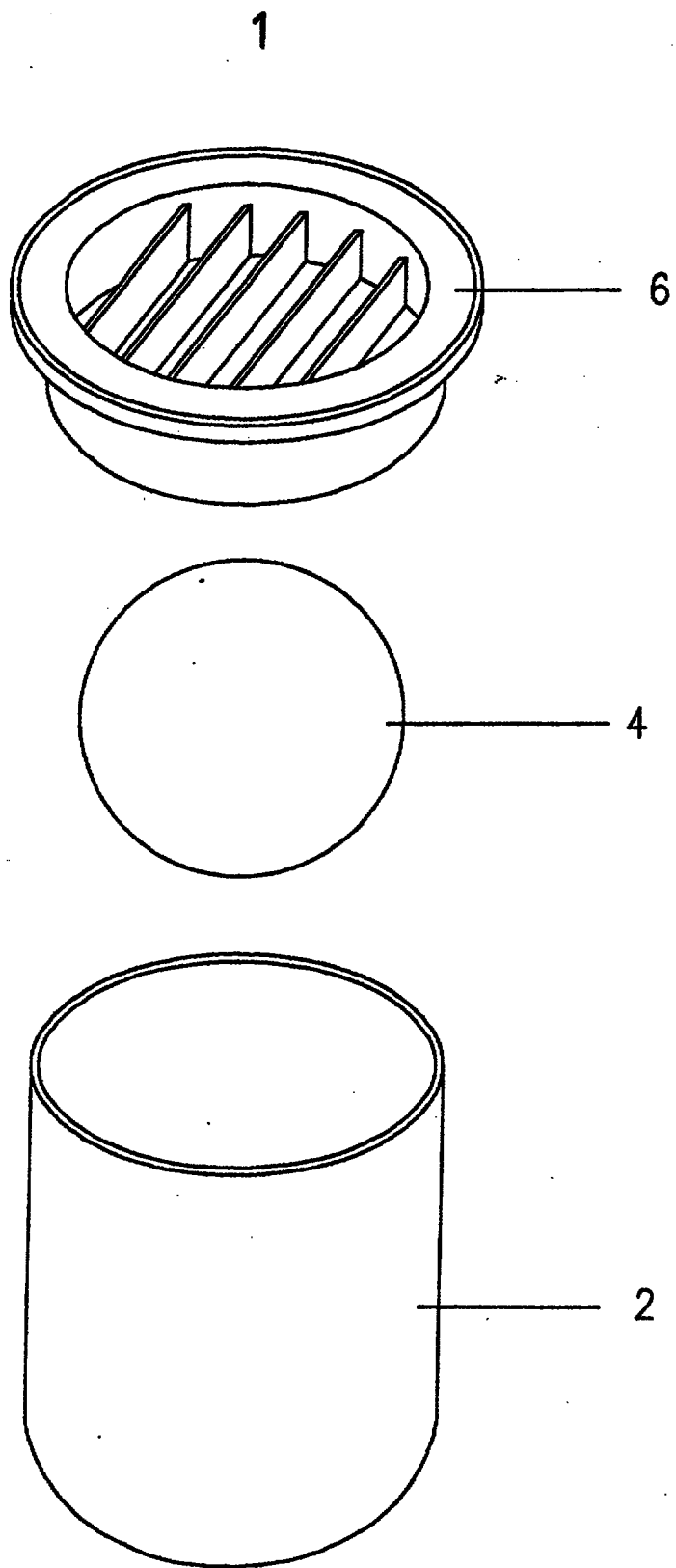


Fig 1

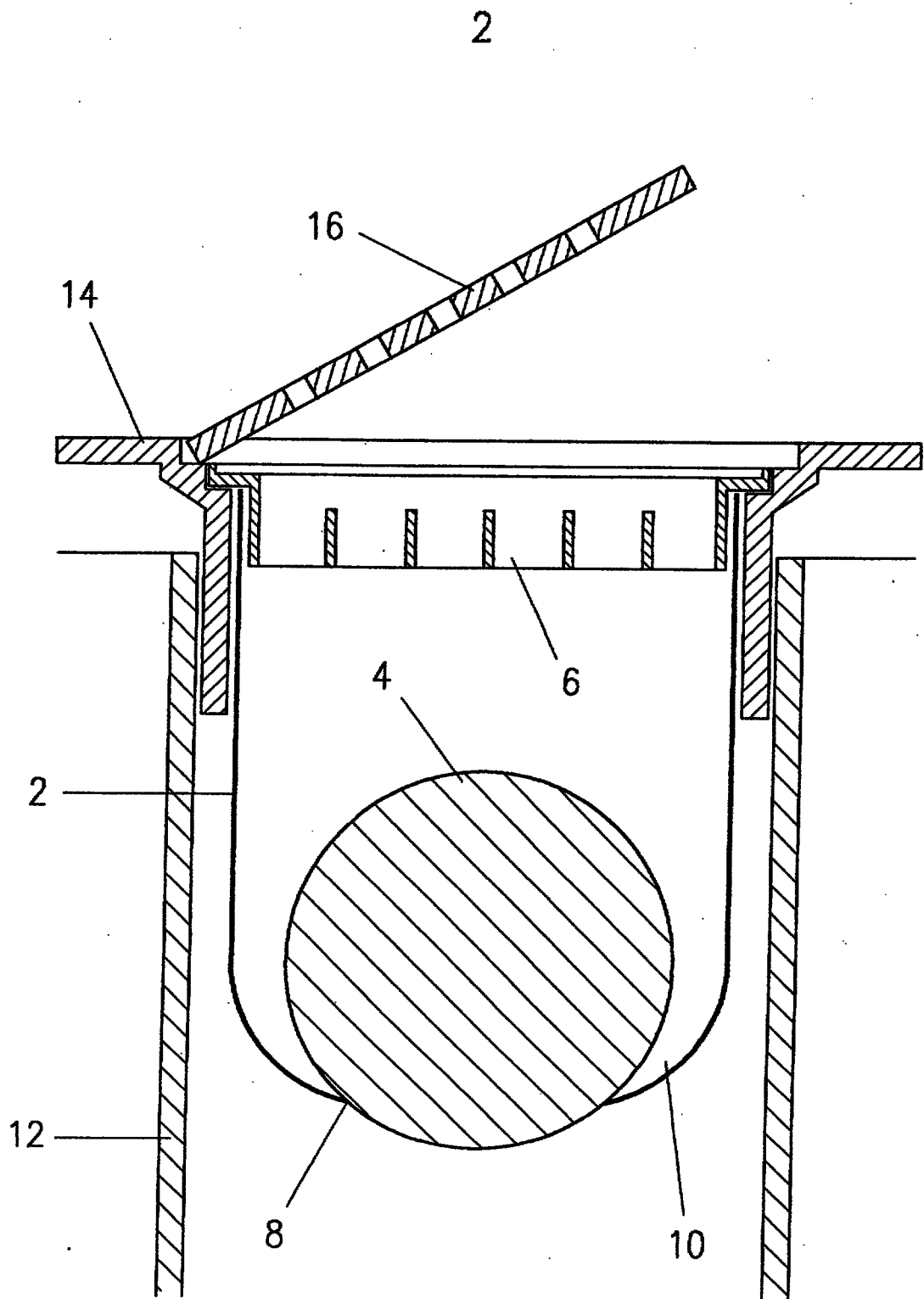


Fig 2

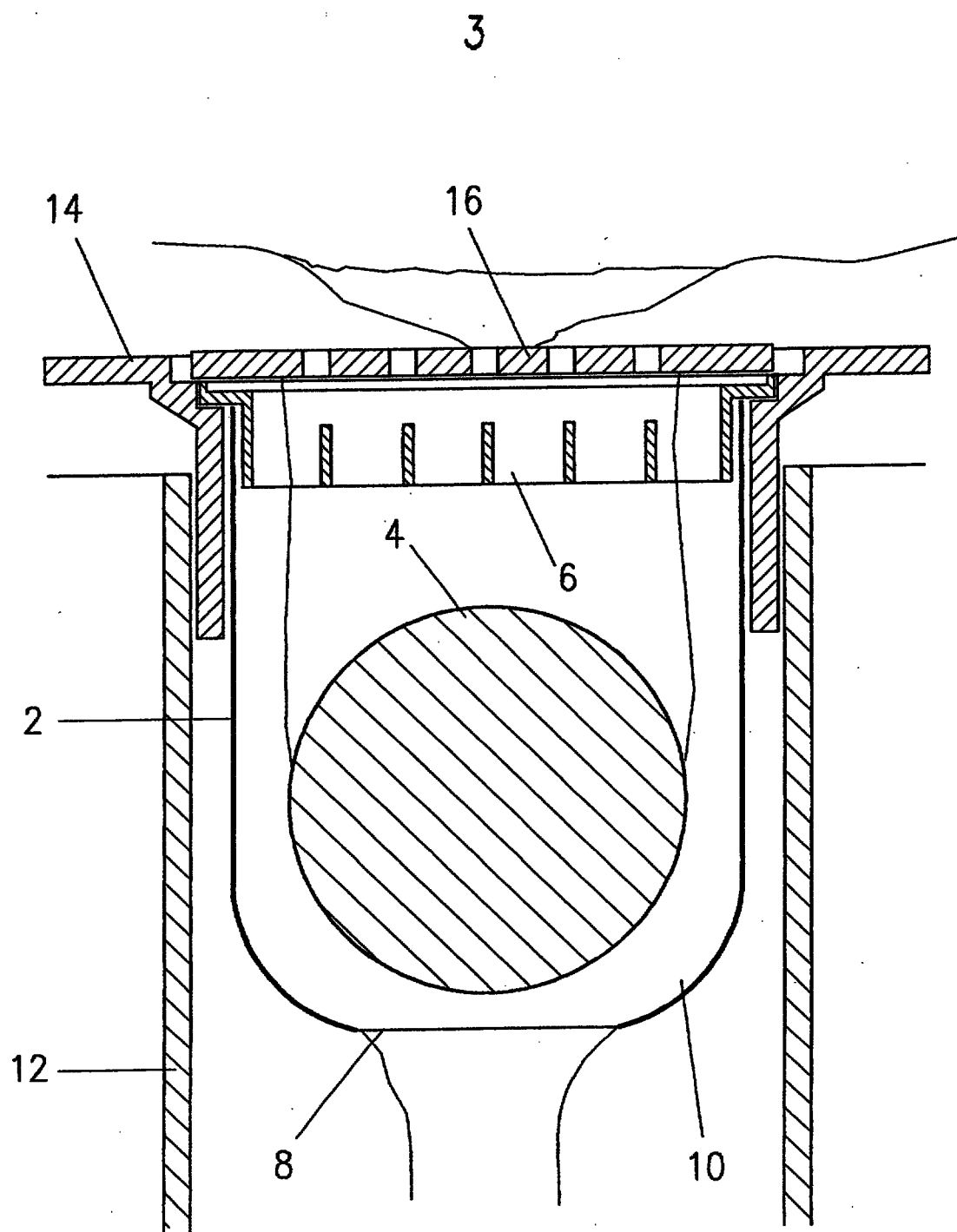


Fig 3

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Such reservoirs do not, however, prevent certain pests or insects, for instance cockroaches, from crawling up the drains. These insects are able to pass through the reservoirs and enter the rooms or sinks etc., through the plug or drain holes. Such reservoirs can also provide breeding grounds for insects, such as mosquitos, if they are not used for any length of time and become stagnant. Such pests as breed in the reservoirs or pass through them can be both a nuisance to the inhabitants of the house and hazardous to health.

These problems are not just confined to houses but to other premises, for instance leisure, industrial and commercial premises or drains to almost any enclosed space. It is an object of the invention to allay these problems, at least partially, and preferably to prevent pests, insects and smells from passing through drainpipes out through the drain and/or plug holes.

According to the present invention there is provided a valve for a liquid drain, comprising a body for fitting into the drain and having a drain inlet, and an exit aperture, and a buoyant valve element arranged in the body, to be moved, by its own buoyancy in liquid flowing through the body, from a rest position in which it sits on the drain inlet side of the exit aperture and seals the exist aperture to an open position where it floats above the exit aperture thereby opening the exit aperture to allow said liquid to pass from

the drain inlet through the body and out through the exit aperture.

Preferably there are means to prevent the valve element escaping from the body. The exit aperture may be circular. The valve element may be spherical.

The present invention also provides a method of selectively sealing a liquid drain, comprising the steps of providing a valve body in the drain, the valve body having a drain inlet and an exit aperture, and providing a buoyant valve element arranged in the drain and valve body, to be moved, by its own buoyancy in liquid flowing through the body, from a rest position in which it sits on the drain inlet side of the exit aperture, and seals the exit aperture, to an open position where it floats above the aperture, thereby opening the exit aperture to allow said liquid to pass from the drain inlet, through the body and out through said exit aperture.

In order that the present invention may be more readily understood the following description is given, merely by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of component parts of an embodiment of the invention;

Figure 2 is a cross-sectional view of the embodiment of Figure 1 when installed; and

Figure 3 is a similar view to that of Figure 2, during flow of water.

Figure 1 shows a first embodiment of the present invention. In this embodiment the liquid valve consists of three components: a main body 2, a valve ball 4, and a lid 6. As can be seen in Figure 2, during use, the valve ball 4 sits loosely in the main body 2. The ball 4 is prevented from escaping from the main body by the lid 6.

The main body comprises a hollow cylinder which is open at one end and converges at the other end 10 to a circular hole 8 which is symmetrical about the centre of axis of the main body.

The lid 6 may sit either loosely or tightly in the main body 2. It may be sealed on or detachably attached for example by clips or a screw thread, screwing onto or into the main body 2.

In use, as can be seen from Figures 2 and 3, the valve is placed into a drain pipe

12 in the floor. The pipe already has an entrance rim 14 with a grating 16 of elongate, circular or other shaped holes. The main body should preferably fit exactly into the pipe to prevent escape of pests or smells from between it and the pipe. The main body fits within the rim 14 with the valve lid 6 sitting on a ledge. The main body is situated with the converging end 10 lowermost and the hole 8 provides a seat for the valve ball 4. Normally the valve ball 4, under the action of gravity, seals the hole 8 preventing free movement within the drain of air, insects, or small amounts of liquid.

The valve can be placed almost anywhere in the pipe but preferably within the upper part of the drain immediately beneath the plug or drain hole. The lid 6 also has a grating to allow liquid to pass through it freely. The valve can be placed such that the lid 6 can be almost immediately adjacent the grating 16 of the plug or drain hole itself.

Water which passes through the floor grating passes into the main body 2 of the valve. It passes the sides of the loose-fitting ball collecting in the converging end 10. When

sufficient liquid has accumulated in the converging end 10 above the valve seat 8, the valve ball 4 will have sufficient buoyancy to float up away from the hole 8, thereby allowing liquid to flow out from the main body through the lower hole 8. This is shown in Figure 3 where the volume of liquid entering the main body is sufficient to float the valve ball 4 above the hole 8. As the flow of liquid into the main body stops, the remaining liquid flows out until there is an insufficient amount to provide buoyancy to the ball, in which case it reseals the hole 8.

Thus the only time the hole 8 is unsealed is when there is liquid flow through the drain hole and down through the drain. Otherwise the drain is sealed. If the main body 2 overflows the valve ball 4 is prevented from floating away by the lid 6.

Typically the body 2 and lid 6 may be made from PVC or almost any other type of mouldable plastic, or even metal or ceramics. The parts may be of different materials if preferred.

Similarly the valve ball 4 can be made of almost any material, for instance Stavax (Trade Mark). It may be solid or hollow but must be of sufficient weight to prevent insects from pushing it aside in order to crawl up through the main body. On the other

hand it cannot be too heavy so that it does not float without the main body 2 being totally full. Its average density must be sufficient for it to float in water.

To prevent stagnation of the liquid remaining in the lower end 10 of the main body 2 it is possible to provide means to allow all the liquid to be removed. Preferably, there are one or more gaps between the valve ball 4 and valve seat 8. These might be in that the order of 1mm or less across to allow any remaining liquid in the lower end 10 of the main body 2 to escape. Alternatively, the lower part of the main body 2 may have areas of a very fine gauze, or cloth etc. around the seat or in other holes.

Not only does this invention prevent the breeding of mosquitos in the traps and the entrance of cockroaches or other insects into the house but also provides an alternative means for controlling the escape of foul air through the drains and can be used to reduce it.

All the components may be of different shapes to those illustrated, for instance the main body may be square in cross section or of a conical profile and/or the valve ball may also be conical. Nor is it necessary for the valve to be situated in vertical or near-vertical pipes. Valves according to the invention could be used in almost any pipe through which a flow of liquid is intended. Further, the lid may be replaced with other means to prevent the ball from "escaping" such as protrusions, restraining wire, etc.

CLAIMS

1. A valve for a liquid drain, comprising a body for fitting into the drain and having a drain inlet and an exit aperture, and a buoyant valve element arranged in the body, to be moved, by its own buoyancy in liquid flowing through the body, from a rest position in which it sits on the drain inlet side of the exit aperture and seals the exit aperture, to an open position where it floats above the exit aperture, thereby opening the exit aperture to allow said liquid to pass from the drain inlet through the body and out through the exit aperture.
2. A valve according to claim 1 further comprising means to prevent said valve element passing out from said body.
3. A valve according to claim 1 or 2 wherein said exit aperture is circular and said valve element is arranged to plug said exit aperture with a circular plug of the same size as the exit aperture.
4. A valve according to claim 3 wherein said valve element is spherical.
5. A valve according to any one of the preceding claims wherein a portion of the said body is a hollow cylinder.
6. A valve according to any one of the preceding claims wherein walls of the body slope towards the exit aperture.
7. A valve according to any one of the preceding claims, wherein said valve element is biased towards its rest position by a force due to gravity.
8. A valve according to any one of the preceding claims fitted in a drain whereby liquid passes from the drain inlet through said body from the side of the exit aperture on which the valve element sits and out through said exit aperture.



9. A method of selectively sealing a liquid drain, comprising the steps of providing a valve body in the drain, the valve body having a drain inlet and an exit aperture, and providing a buoyant valve element arranged in the drain and valve body, to be moved, by its own buoyancy in liquid flowing through the body, from a rest position in which it sits on the drain inlet side of the exit aperture, and seals the exit aperture, to an open position where it floats above the aperture, thereby opening the exit aperture to allow said liquid to pass from the drain inlet, through the body and out through said exit aperture.

