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(54) **Plug for liquid containers**

(57) A plug is shown for use primarily with personal sinks and bath. The plug has an upper shell with orifices (203) therein along with a diaphragm (205) configured to cover said orifices to prevent evacuation of liquid therethrough. If a level of water exceeds a predetermined value, a releasing arrangement (208, 207) is configured to release the diaphragm so as to allow water to pass through the orifices.

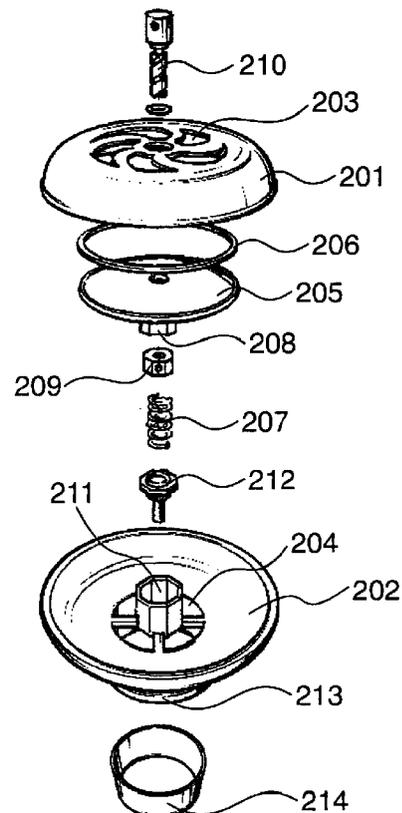


Figure 2

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Description

The present invention relates to a plug for liquid containers, wherein liquid is drained from said containers under the influence of gravity by removal of said plug.

Introduction

Plugs for liquid containers, such as baths and sinks for holding water and transport containers for holding other fluids, such as petrol and oil etc, have been known for many years. In some situations, a container is filled by a continuous stream of liquid and under these circumstances it is possible for the container to overflow.

When used for ablutionary purposes, such as in baths and sinks, the overflowing of water may cause extensive damage to fittings and structures etc and may also be dangerous if, for example, someone has become incapacitated while laying in a bath which is being filled.

Known solutions involve including overflow outlets in baths and sinks etc or including other mechanisms within the bath or sink so as to allow water to escape if the level of the water exceeds a pre-determined height. Such arrangements have several distinct disadvantages. Firstly, it is not possible to adjust the level at which water escapes as the water will always escape at the point where it reaches the level of the overflow. Secondly, it is difficult to check that an overflow system is working and extremely difficult to retro-fit an overflow system to an existing arrangement.

The problems associated with overflows have become more prevalent in institutional environments where insurance premiums may be related to the probability of damage being incurred. Thus, if a proprietor can provide evidence to the effect that overflows will not occur, it is possible that premiums may be reduced.

In other situations the overflowing of liquids may also lead to unnecessary or undesirable waste and the presence of a system to prevent overflow conditions may discourage overflow situations from developing and therefore discourage waste etc.

Summary Of The Invention

According to a first aspect of the present invention, there is provided a plug for liquid containers, wherein liquid is drained from said containers under the influence of gravity by removal of said plug, said plug comprising an upper shell having an orifice therein and an upper surface arranged to contact the said liquid; sealing means configured to cover said orifice to prevent evacuation of liquid therethrough; and releasing means configured to release said sealing means if the weight of liquid applied to said sealing means exceeds a predetermined value.

The plug may be used for many containers having

holes through which liquids may be allowed to escape but in a preferred embodiment the plug is adapted for use in personal sinks and baths.

In a preferred embodiment, the releasing means is adjustable so as to adjust the predetermined level. The releasing means may include a spring along with means for applying a bias to said spring in order to adjust said level. The bias may place the spring into compression and further compressive force is then required to effect the release. Preferably, the compression is effected by rotation of a thread having a bolt co-operating therewith and the plug may be configured such that the device remains operational after removal of said thread.

In a preferred embodiment, the upper shell has a plurality of orifices and these orifices may be configured to induce rotational flow of liquid when said liquid passes therethrough.

Preferably, the sealing means includes a diaphragm plate and a gasket position between said plate and said upper shell.

Brief Description Of The Drawings

A personal bath is shown in Figure 1, having a plug assembly locatable within an outlet;
 Figure 2 details an exploded view of the plug assembly shown in Figure 1, including a releasing mechanism;
 Figure 3 details the releasing mechanism identified in Figure 2; and
 Figure 4 details an alternative embodiment for use with pop-up systems.

Detailed Description Of The Preferred Embodiments

The invention will now be described by way of example only with reference to the accompanying drawings identified above.

A personal bath 101 is shown in Figure 1, having a hole 102 through which water is evacuated after use. During use, the hole is covered by a plug 103 which, in accordance with the present invention, is configured to allow water to pass therethrough if the level of water exceeds predetermined value.

The plug 103 is located within the hole 102 by manual operation and is similarly removed therefrom to allow the water to escape. If required, the plug may be attached to a chain 104 or, with a suitable modification, the plug may be configured within a pop-up mechanism, such that the plug 103 may be displaced from the hole 102, by operation of an external lever, so as to allow evacuation of the water without manually entering the water itself.

Although described with reference to use in personal baths, the device may also have application in other environments, with containers containing other liquids.

An exploded view of plug 103 is shown in Figure 2. The plug consists of an upper shell 201 arranged to be welded to a lower shell 202 using sonic welding techniques. The upper shell 201 includes a plurality of orifices 203 arranged to allow water to flow therethrough while encouraging said water to rotate, in a form of a vortex, so as to increase the velocity of said water through the device. The lower shell 202 also includes orifices 204, arranged to direct flowing water through output hole 102.

The plug includes a sealing means in the form of a moving diaphragm 205 in combination with a tapered gasket seal 206, arranged to be held in position by the upper shell 201. A compression spring 207 is configured to force the moving diaphragm 205 against a lower surface of the upper shell 203, against the gasket seal 206, so as to prevent water flowing through orifices 203.

Spring 207 is held within an upper octagonal bushing 208 extending from the lower surface of diaphragm 205. The bottom of compression spring 207 is secured by an octagonal nut 209 secured by a thread 210.

Upper octagonal bushing 208 is arranged to engage within a lower octagonal bushing 211 such that the upper octagonal bushing may descend within the lower octagonal bushing 211 as the diaphragm 205 is forced downwards under the weight of water applied to the diaphragm through upper orifices 203.

A hole is present in the bottom of the lower octagonal bushing, through which a threaded brass stud 212 extends. The stud includes a seating on its upper surface arranged to co-operate with spring 207 and thereby hold the spring firmly in position. The lower threaded portion of the stud allows an extending member to be connected thereto, so as to allow the plug to be used in "pop-up" configurations.

The lower surface of the lower shell 202 includes a tapered plug seating 213, arranged to co-operate with a tapered sealing gasket 214, so as to ensure that a watertight seal is provided between the bottom of the lower shell and exit hole 102.

The releasing means, arranged to allow water to escape when the height of water exceeds a predetermined level, is detailed in Figure 3. The upper octagonal bushing 208 is shown in co-operation with the lower octagonal bushing 209. As water pressure is applied to the diaphragm 205, the upper octagonal bushing 208 is forced downwards, thereby applying force to the compression spring 207. Eventually, this compressive force will exceed the reactive force of the spring and the diaphragm will be allowed to move, with the upper bushing 208 being received within the lower bushing 209. As the diaphragm moves, water will enter the upper orifices 203 pass around the diaphragm 205 and exit through the lower orifices 213. Usually, this will result in the water level dropping and if water continues to flow into the bath, an equilibrium point will usually be reached with the amount of water flowing out through mechanism equaling the amount of water flowing in. As the

amount of water flowing into the bath reduces, the height of water will decrease, resulting in compression spring 207 extending so as to force the diaphragm back into position, which will eventually result in the closure of orifices 203.

The amount of reactive force applied by spring 207 upon the diaphragm 205 is substantially proportional to its degree of compression therefore the size of the reactive force will increase as the spring is compressed. This compression may take place, as described above, by the extension of the upper bushing 208 into the lower bushing 209, allowing water to flow through the device. In addition, the height at which this activation takes may be adjusted by applying a compressive bias to the spring 207. This is achieved by rotating thread 210 in a clockwise direction, as indicated by arrow 301. Octagonal nut 209 is held within the upper bushing 208 and as such is unable to rotate. The nut includes internal pins which locate within helical thread 210 such that, as the thread is rotated in a clockwise direction, nut 209 is forced downwards, in the direction of arrow 302, so as to compress spring 207 within the lower bushing 211. Similarly, anticlockwise rotation of thread 210 will result in nut 209 moving upwards into the upper bushing 208, so as to reduce the compressive forces within spring 207 and thereby allow the diaphragm 205 to be forced away from the upper shell 201 with a reduced height of water. Thus, in this way, by rotation of thread 210, it is possible to adjust the height at which water will be allowed to pass through the device.

Thread 210 is tapped at a relatively high pitch so as to ensure that a relatively large movement occurs in the direction of arrow 302 for a relatively small rotation in the direction of arrow 301. In this way, it is possible to achieve a full range of useful water heights under the control of a single rotation of thread 210.

The top of thread 210 includes a fixing member 303, arranged to assist in manual rotation of said thread and also to allow said thread to be connected to chain 104.

The bottom of spring 207 is held against threaded stud 212 which, as previously described, is configured to co-operate with an extending member.

A plug is shown in Figure 4, modified for operation with a pop-up device. The pop-up device includes a mechanism for pushing suitably designed plugs upwards and out of their respective hole 102 so as to allow water to pass therethrough. As shown in Figure 4, the plug 103 has been modified to include an extension shaft 401 attached to stud 212. This extension shaft co-operates with pop-up mechanisms, in a substantially conventional way such that the device may be used in a pop-up configuration.

55 Claims

1. A plug (103) for liquid containers, wherein liquid is drained from said containers under the influence of

gravity by removal of said plug, said plug comprising

an upper shell (201) having an orifice (203) therein and an upper surface arranged to contact said liquid; 5
 sealing means (205) configured to cover said orifice to prevent evacuation of liquid there-through; and
 releasing means (208, 211, 207) configured to 10
 release said sealing means if the weight of liquid applied to said sealing means exceeds a predetermined value.

2. A plug according to claim 1, wherein said plug is adapted for use in personal sinks and baths. 15
3. A plug according to claim 1 or claim 2, wherein said releasing means is adjustable so as to adjust said predetermined level. 20
4. A plug according to claim 3, wherein said releasing means includes a spring (207) and means (210, 209) for applying a bias to said spring in order to adjust said predetermined level. 25
5. A plug according to claim 4, wherein said bias places said spring into compression and further compressive force is required to effect said release. 30
6. A plug according to claim 5, wherein said compression is effected by rotation of a thread having a nut (209) co-operating therewith.
7. A plug according to claim 6, wherein said spring is held in position after removal of said thread so that the device remains operational. 35
8. A plug according to any of claims 1 to 7, wherein said upper shell has a plurality of orifices (203) therein. 40
9. A plug according to claim 8, wherein said orifices are configured to induce rotational flow of liquid when said liquid passes therethrough. 45
10. A plug according to any of claims 1 to 9, wherein said sealing means includes a diaphragm plate (205) and a gasket (206) positioned between said plate and said upper shell. 50

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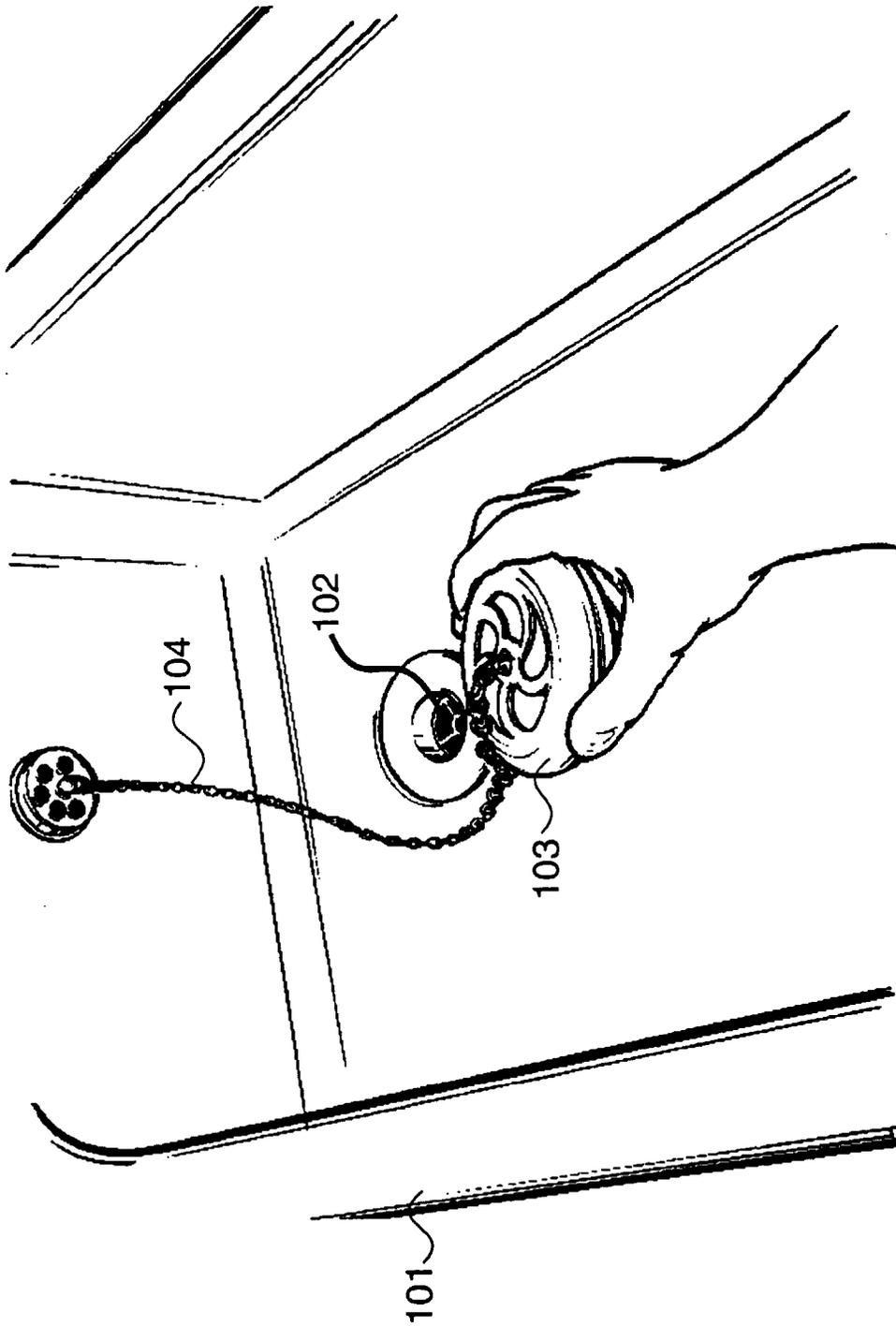


Figure 1

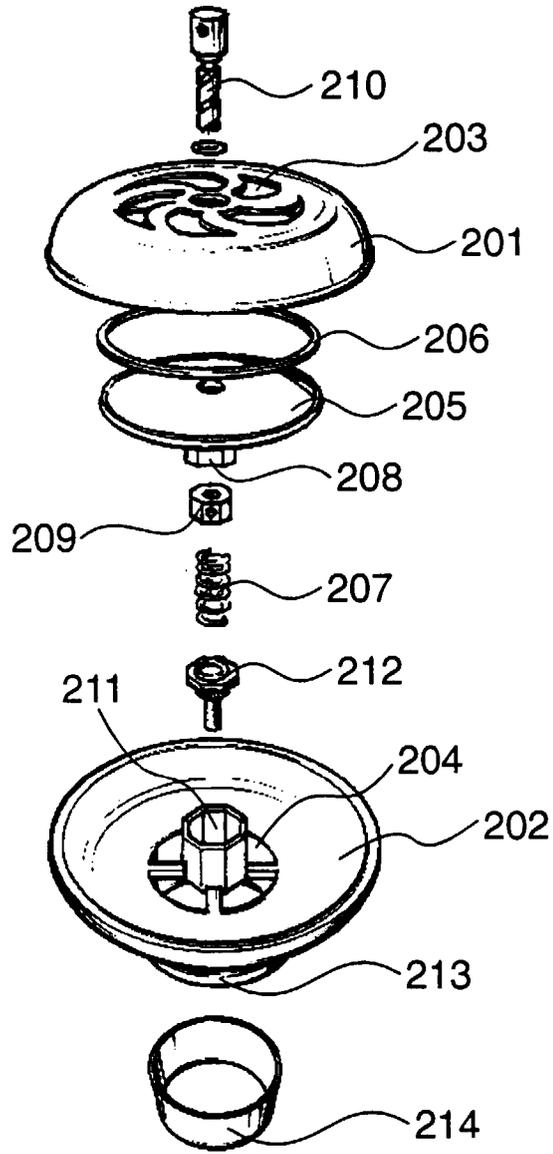


Figure 2

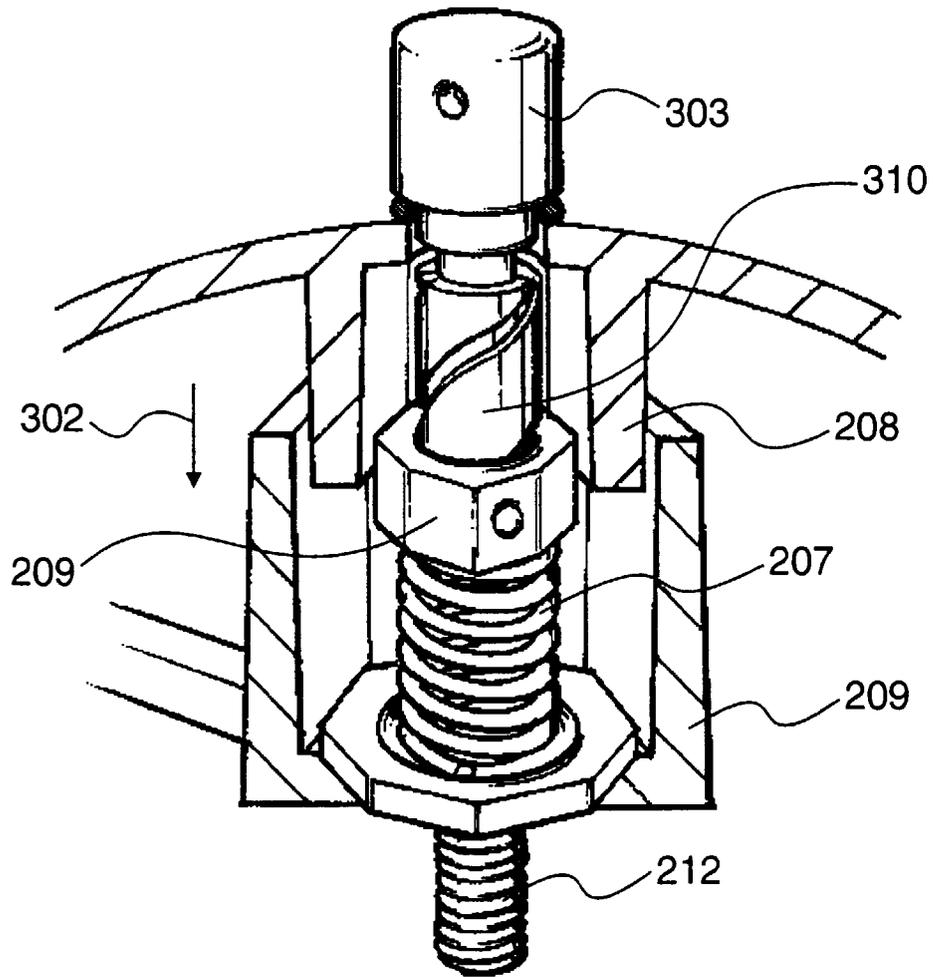


Figure 3

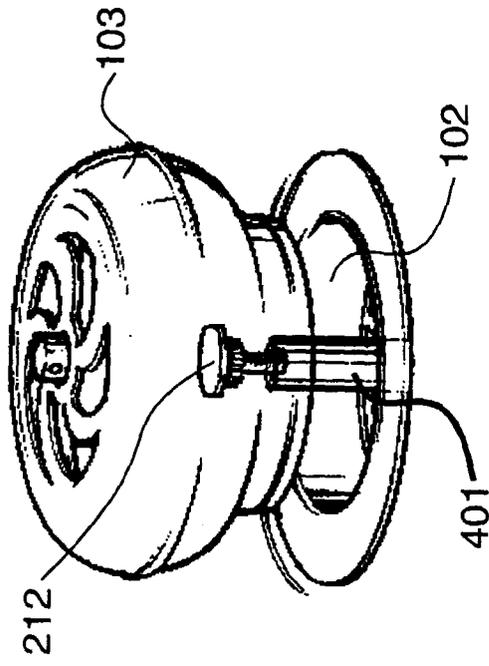


Figure 4



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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 8204

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	DE 94 21 018 U (BLANEY) * the whole document * ---	1-6,8,10 7	E03C1/242 E03C1/22 A47K1/14
X A	DE 480 935 C (SCHÄFER) * the whole document * ---	1-6 7-10	
X	DE 22 63 662 A (GEWERKSCHAFT KERAMCHEMIE) * the whole document * ---	1-6	
X	US 3 911 508 A (GOLDBERG) * column 2, line 62 - line 66; figures * ---	1-8	
Y	DE 91 10 721 U (HANS GROHE GMBH & CO KG) * page 2, paragraph 3 - paragraph 4 * ---	7	
A	GB 204 128 A (RAWLINGS) * figure 4 * -----	7	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E03C A47K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 April 1997	Examiner Van Beurden, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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