(12) UK Patent Application (19) GB (11) 2 285 216 (13) A

(43) Date of A Publication 05.07.1995

(21) Application No 9500042.8

(22) Date of Filing 04.01.1995

(30) Priority Data
(31) 9400005 (32) 04.01.1994 (33) GB
9413224 01.07.1994

(71) Applicant(s)
Robert Malcolm Stewart
58, Anerley Park,, Crystal Palace,, LONDON, SE20 8NQ, United Kingdom

Trevor Blaney
58, Anerley Park, LONDON, SE20 8NQ, United Kingdom

(72) Inventor(s)
Trevor Blaney

(51) INT CL^6
A47K 1/14 , E03C 1/23 1/232

(52) UK CL (Edition N)
A4N N3F2

(56) Documents Cited
DE 003108791 A DE 002825978 C

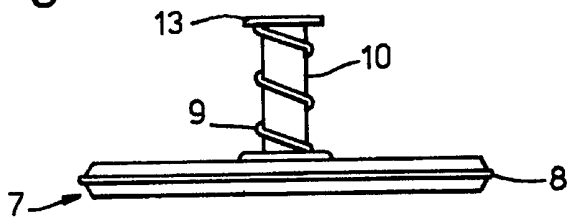
(58) Field of Search
UK CL (Edition N) A4N N3F2 , F2V VV14
INT CL^6 A47K 1/14 , E03C 1/23 1/232
Online database: WPI

(74) Agent and/or Address for Service
Brookes & Martin
High Holborn House, 52-54 High Holborn, LONDON, WC1V 6SE, United Kingdom

(54) **Overflow preventer**

(57) An overflow preventer comprising a plug receivable in a drain hole and provided with a valve (7) movable between a first closed position and a second open position, the valve being resiliently biased to the first position while the pressure on the valve is less than a predetermined value.

Fig.4.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

Fig.1.

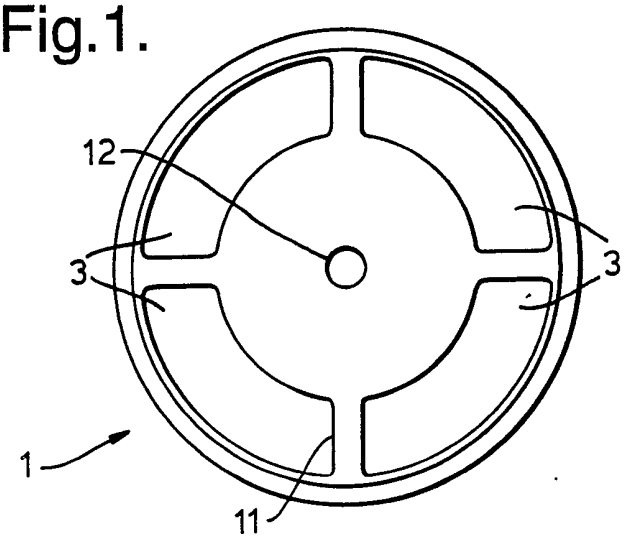


Fig.2.

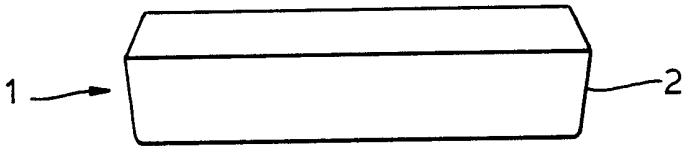


Fig.3.

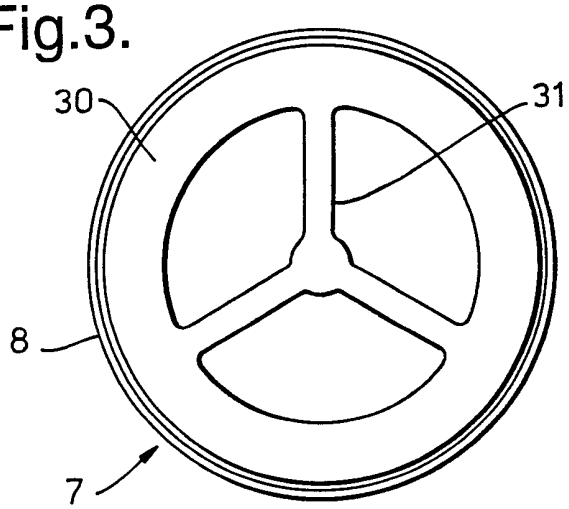


Fig.4.

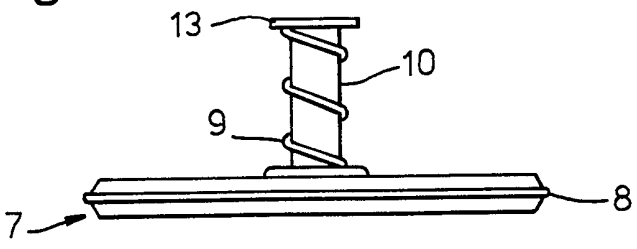


Fig.5.

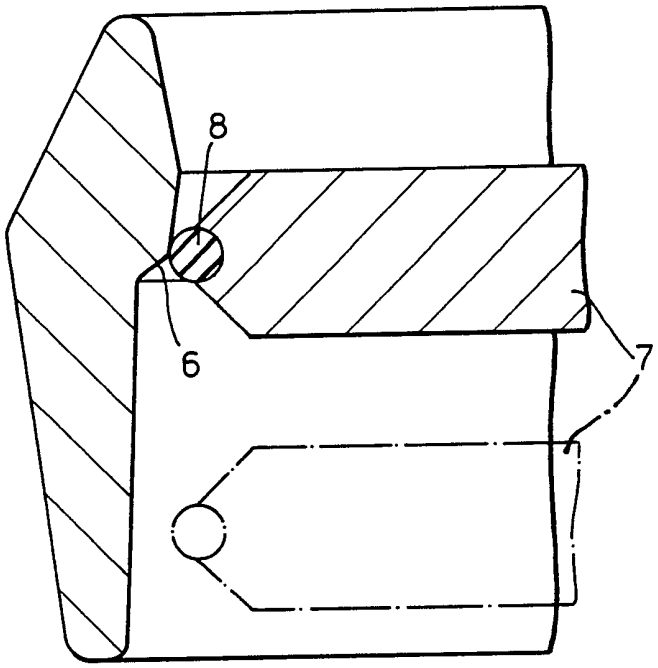


Fig.9.

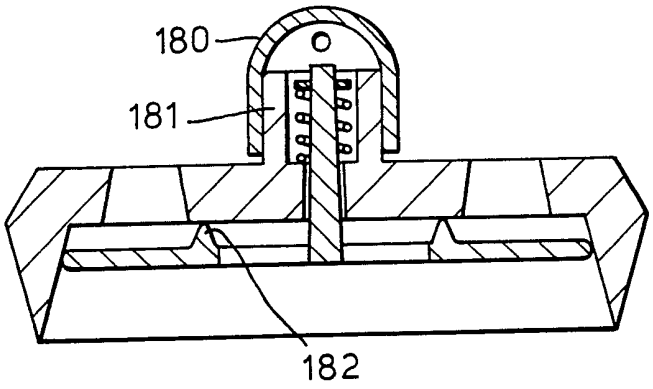


Fig.6.

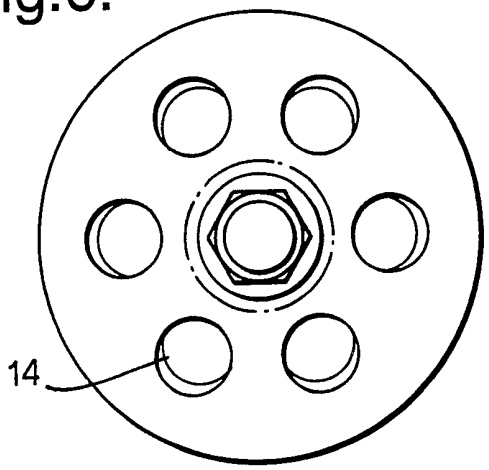


Fig.7.

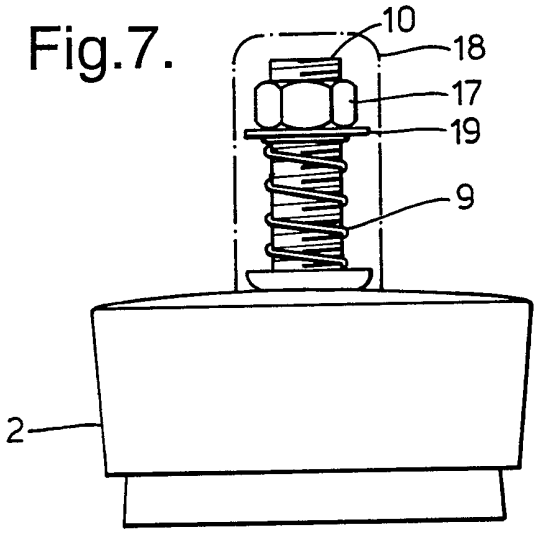
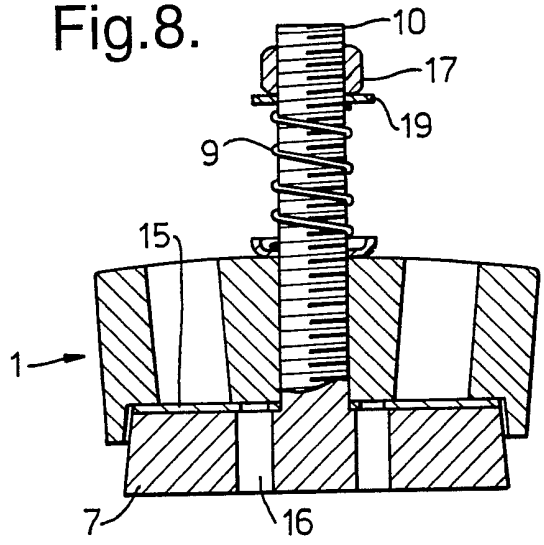


Fig.8.



OVERFLOW PREVENTER

This invention relates to an overflow preventer primarily but not exclusively for baths and sinks.

Baths and sinks may be provided with overflows which direct excess water to a drain. The overflow may however not be able to cope with the flow of water and spillage may still occur.

GB 2 261 600 (Lewis) describes an overflow preventer in which passage of water through a conduit attached to the overflow causes the plug to be displaced from the overflow. The arrangement is very expensive to make and fit. Furthermore when the preventer is actuated its action is irreversible. This means that if a bath is filled rather full and a bather displaces water so that some passes through the overflow the device will be actuated and unless reset all the water will drain from the bath leaving the bather high and dry.

According to some embodiments of the invention there is provided an overflow preventer comprising a plug receivable in a drain hole and provided with a valve movable between a first closed position and a second open position, the valve being resiliently biased to the first position while the pressure on the valve is less than a predetermined value.

The valve may be resiliently biased for example by

a spring such as a compression spring or a tension spring.

The valve may be a annular valve. A circumferential valve seat may be provided in the plug. The valve may be provided with an O-ring for sealing on the seat of the valve body. The plug may comprise resilient plastics material. The outer circumference may be provided with an O-ring to engage sealingly with the plug hole.

Embodiments of the invention will be illustrated by way of example only by reference to the accompanying figures of which:

Figure 1 is a top plan of an embodiment of the invention;

Figure 2 is a side view of the plug body of the embodiment of Figure 1;

Figure 3 is a plan of a valve of the embodiment of Figure 1;

Figure 4 is a side elevation of the valve of Figure 1;

Figure 5 is an enlarged scrap cross-sectional view of the preventer of the first embodiment;

Figure 6 is a top plan of a second embodiment;

Figure 7 is a side elevation of the second embodiment;

Figure 8 is a cross sectional view of the second

embodiment, and

Figure 9 is a cross-section of a further embodiment.

The embodiment of Figures 1 to 5 is intended as a replacement for a bath or sink plug. In general a cord or chain or other fastener (not shown) secures the device to the bath or sink in each illustrated embodiment. This is not essential and by way of example the preventer may be fitted to an auxiliary drain and thus a separate plug and plug hole could still be required. The preventer may additionally be fitted to conventional overflows. This could have the advantage of preventing spiders crawling through the overflow and into the bath to the possible horror or in some cases danger of the user. In Australia and some other parts of the world conventional overflows are not fitted because of the danger of venomous spiders living in the overflow. Since the preventor of the invention is closed in the rest position any spider living in the overflow is unlikely to be able to escape into the bath of a user. The embodiment therefore has a body (1) for reception in or over the plug hole. Conveniently the body comprises a plastics material. Preferably the plastics has a degree of resilience to assist in forming a watertight fit to the plug hole. Fitting may also be facilitated by providing a tapered portion (2) on the body. Preferably the taper is in the

range 5 to 10° preferably 7 to 9° especially about 8°. This may also allow a preventer to be fitted to a range of different sizes of plug hole. It may be desirable to provide an O-ring (not shown) received in a peripheral groove of the body (1) to provide even better sealing. As can be seen from Figure 1 conduits (3) are provided in the body which communicate with the valve to be described hereinafter. In the illustrated embodiment the conduits are on the top face of the body but they could be provided on the side although a less compact device might result. Preferably the conduit's area is about 20% or 25% to 60% more preferably 30 to 50% of the area of the top face area of the preventer. If the area is too low then drainage may prove too slow and also BSI (British Standard Institute) recommendations may not be complied with. If much greater than about 60% the top face may be too weak. The precise area is not however of the essence of the invention.

A lip (6) is provided in the body and as described hereinafter this acts as a valve seat in the illustrated embodiment.

A valve (7) is provided. In the embodiment described it comprises a disc preferably of plastics material especially resilient plastics material. An O-ring (8) may be provided in the circumference to form a good seal with the seat (6). Where the valve is of or

coated with resilient material a good seal may be obtained without an O-ring. Alternatively or additionally an O-ring may be provided on the seat in the rest position the valve (7) is biased against the valve seat (6) to form a seal. When the bath is filled with water the pressure on the valve increases. If filling is continued the pressure on the valve (7) will overcome the bias and urge the valve (7) off the valve seat (6). The valve will then move for example to the position shown in ghosted lines in Figure 5. The conduit (3) will then be open and excess water will run away to waste. When supply of water to the bath stops water will drain away until the pressure of water no longer overcomes the bias. The bias will then urge the valve (7) back to the seat (6) and prevent further flow. The valve member (7) of this embodiment is broadly wheel-shaped having an outer rim (30) connected to the valve rod (10) by three peripheral spokes (31). When the valve is in the no load position the peripheral area is sealed by the rim engaging the lip. The valve rod guide (12) overlies the gaps in the valve (7) defined by the rim (30) and spokes (31) preventing escape of water in the no load position. When actuated water escapes not only around the rim by also through the gaps defined by the rim and spokes. This allows a high volume of water to pass through the valve when actuated.

The preferred bias is a spring (9) but this is not essential for the performance of the invention. In the illustrated embodiments the valve depends from a valve rod (10). In the preferred embodiment the valve rod (10) is received in a valve rod guide (12) which in combination with legs (11) of the body (1) define conduit openings (3).

A spring (9) is received over the valve rod and held in position for example by a clip (13). Spring production is now a well understood art and the production of springs of the desired strength is relatively straightforward. It may not therefore be necessary to provide an adjuster to adjust the force produced by the spring. The valve is preferably a pop valve which stays closed until the pressure exceeds an operating valve and then opens widely. By appropriate spring selection this should be readily achievable.

An embodiment of Figs. 1 to 5 was subject to a test which the drain hole of a bath was 0.685m above an open discharge. The temperature was 20°C. The device was seemed into the drain hole. The conduit area of the body was 555.26 mm^2. The plan areas of the top of the body was about 3165mm^2. As the base and valve separated an additional gap of 125.68 mm^2 per mm drop was created. A spring opening at 0.023 m (9") was selected and the rate of water flowing into the bath adjusted until a steady

strike was achieved. This was found to be 4.17×10^{-4} m^3s^{-1} (5.5. UK gals/min).

The specific rate of discharge was therefore about 0.13 ms^{-1}. It is preferred that the specific rate of discharge under the above conditions be at least 0.1 ms^{-1} preferably at least 0.125 ms^{-1} still more preferably at least 0.175 ms^{-1} and yet more preferably at least 0.2 ms^{-1} even more preferably at least 0.25 ms^{-1}. The specific rate of discharge is important. If it is too low then a large device will be necessary to pass sufficient water. A high specific rate of discharge can be obtained by providing both the body and valve with holes which are closed when the valve is in the rest position and open when the valve is activated. This can be achieved by overlying solid portions of the body over conduit portions of the valve and vice versa.

It is preferred that the open area increase as the valve moves further away from its rest position since the efficiency will then increase with rate of discharge.

In the event that water passes through a conventional overflow to discharge a primitive pump or suction action may still further increase the devices efficiency.

If desired a cover (not shown) may be provided over the valve rod and spring.

Modifications to the invention will be apparent to

workers skilled in the art. For example in the second illustrated embodiment a plurality of cylindrical holes (14) are formed in the body (1). The face of the valve (7) has a resilient coating (15) for example of rubber to improve sealing with the valve seat. When the water pressure on the valve (7) exceeds the biasing force of the spring (9) the excess water escapes around the edge of the valve and through channels (16) where provided. The biasing force provided by the spring can be adjusted by moving a nut (17) bearing on a washer (19) on the threaded portion of the valve rod (10). A cover (18) is provided on the body (1) over the valve rod and spring.

In the third embodiment of the invention illustrated in Figure 9 the device is provided with cover (180). Cover (180) is provided with a coating of thermal changing material. For example a liquid crystal material changing to red at a temperature of about 50°C may be provided. Where present the thermal colour changing material provides a warning of excessive water temperature. If the cover (180) is transparent or translucent the colour changing material can be present on the inside of the cover and thus be relatively resistant to wear.

The cover (180) can be an interference fit on a preferably cylindrical upstand (181) provided on the body. If this is done the cover (180) may be of resilient

material which can be slipped over the upstand. A fixing cahin or cord carried on the cover may be provided to secure the device to the bath or sink.

In some embodiments of the invention as for example that shown in Figure 9 a seal is provided on the face of the valve abutting the body. The seal can comprise a raised circular resilient member (182) formed in either or both the valve or the body. This seal serves to reduce leakage.

It may be desirable to provide a draft angle on the cavities of valve or body. This serves to facilitate moulding if the device is made of plastics and may also increase throughput.

Although the invention has been discussed by reference to baths it will be apparent that it has utility elsewhere notably in basins and cisterns. The skilled will have no difficulty in altering the biasing force to provide the desired maximum depth before the preventer actuates.

CLAIMS:

1. An overflow preventer comprising a plug receivable in a drain hole and provided with a valve movable between a first closed position and a second open position, the valve being resiliently biased to the first position while the pressure on the valve is less than a predetermined value.

2. A preventer as claimed in claim 1 wherein the valve is resiliently biased by a spring.

3. A preventer as claimed in claim 2 wherein the spring is a compression spring.

4. A preventer as claimed in any one of the preceding claims wherein the valve is an annular valve.

5. A preventer as claimed in claim 4 wherein the plug comprises the valve body with a circumferential valve seat.

6. A preventer as claimed in claim 4 or claim 5 wherein the circumference of the valve is provided with an O-ring for sealing on the seat of the valve body.

7. A preventer as claimed in any one of the preceding claims wherein the plug is of resilient plastics material.

8. A preventer as claimed in any one of the preceding claims wherein the outer circumference of the plug is provided with an O-ring to engage sealingly with the plug hole.

9. An overflow preventer as claimed in any one of the preceding claims having a specific rate of discharge of at least 0.1 ms^{-1}.

10. A preventer substantially as described herein by reference to any one of more of the accompanying figures.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report) -12-

Application number
GB 9500042.8

Relevant Technical Fields

(i) UK Cl (Ed.N) A4N (N3F2); F2V (VV14)

(ii) Int Cl (Ed.6) A47K 1/14; E03C 1/23, 1/232

Search Examiner
D HAWORTH

Date of completion of Search
30 MARCH 1995

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASE: WPI

Documents considered relevant following a search in respect of Claims :-
1-10

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	DE 2825978 C (LANG)	1-10
X	DE 3108791 A (GEBERIT)	1-10

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).