



(11)

EP 2 281 955 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.02.2011 Bulletin 2011/06

(51) Int Cl.:
E03C 1/232 (2006.01)

(21) Application number: **10164527.3**

(22) Date of filing: **31.05.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

(72) Inventors:
• **Ravani, Serafino**
25065 Lumezzane, Brescia (IT)
• **Ravani, Marco**
25065 Lumezzane, Brescia (IT)

(30) Priority: **03.07.2009 IT BS20090128**
15.09.2009 IT BS20090170

(74) Representative: **Chimini, Francesco**
Jacobacci & Partners S.p.A.
Piazza della Vittoria 11
25122 Brescia (IT)

(71) Applicant: **Ravani Sifoni S.r.l.**
25065 Lumezzane, Brescia (IT)

(54) **Drain with plug and overflow function of the plug**

(57) A drain (1) for baths, sinks, washbasins and the like comprises a plug (18) having a head (22) with a seal (24) to close the intake (16). The head (22) is axially movable in relation to the drain (1) between a lowered position, in which it is below the intake (16), and a raised position, in which it is on a level with the intake (16). The plug (18) is positioned on a spring (30) which permits use of the drain as an overflow outlet.

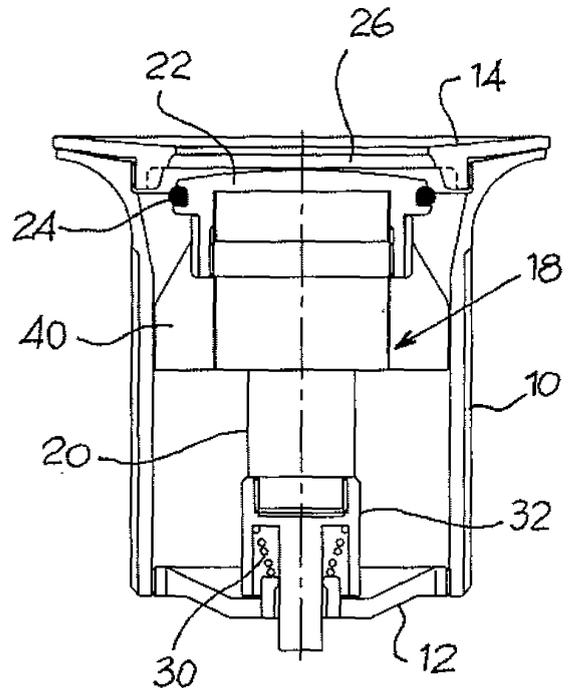


Fig. 3

EP 2 281 955 A1

Description

[0001] The present invention relates to a drain for baths, sinks, washbasins or other collection basins of a liquid.

[0002] In one known embodiment, a drain for baths comprises a substantially cylindrical body suitable for being housed in a hole made in the bath and communicating with a drain pipe. Such body terminates at the bottom with a grid and at the top with an annular flange which defines the intake for the passage of water into the drain body.

[0003] A plug is lodged in the drain body and comprises a head bearing a sealing element suitable for cooperating with the inner rim of the annular flange to hermetically seal the intake for the passage of the water when the head of the plug is level with said flange.

[0004] Normally, the head of the plug projects above the drain body, leaving the passage of the water towards the drain open. When the user wishes to fill the bath, the head is manually pressed downwards, so that it rests with its sealing element on the flange, hermetically sealing such passage.

[0005] The fact that the plug projects upwards from the drain, and therefore from the bottom of the bath is considered by some to be a disadvantage, for example when the area where the plug is situated is also used for having a shower. In this case the protruding plug gets in the way and may inadvertently be pressed down, closing the drain. Moreover, a protruding plug negatively influences the aesthetic appearance of the bath in that it interrupts the continuity of the bottom of the bath.

[0006] Another drawback, especially for baths, is the presence of the so-called "overflow", in other words of the hole made in the side wall of the bath and the relative pipe connecting the hole to the drainpipe.

[0007] In fact the overflow requires that a hole be made in the side wall of the bath, that a cover plate be attached to conceal said hole, allowing the water to pass through it and that connection to a drain pipe be provided, for example between the bath and the structure it is mounted in. In the case of free-standing baths which are fully visible, for example in the centre of a bathroom, the presence of the overflow is a problem felt even more strongly. The negative impact on the aesthetic appearance of the bath, not only of the presence of the side hole but also of the pipe connecting the overflow to the drainpipe, is evident.

[0008] The purpose of the present invention is to propose a drain able to overcome the drawbacks complained of above.

[0009] Such purpose is achieved by a drain according to claim 1. The dependent claims describe preferred or advantageous embodiments of the drain according to the invention.

[0010] The characteristics and advantages of the drain according to the invention will be evident from the description below, made by way of a non-limiting example

of its preferred embodiments with reference to the attached figures, wherein:

[0011] - figure 1 is an axial cross-section of the drain according to the invention, in a first embodiment, with the plug in the normal, open position;

[0012] - figure 2 is an axial cross-section of the drain with the plug in the closed position, preventing the passage of water;

[0013] - figure 3 is an axial cross-section of the drain with the plug in the open position, permitting the passage of water when acting as an "overflow";

[0014] - figures 4-6 are cross-section views, analogous to those above, of a drain in a second embodiment;

[0015] - figures 7-9 are cross-section views, analogous to those above, of a drain in a third embodiment;

[0016] - figures 10 and 11 are cross-section views of a drain in a further embodiment variation, respectively with the plug in the position preventing the passage of water and with the plug permitting the passage of water when acting as an "overflow"; and

[0017] - figure 12 shows a tool for unscrewing the flange of the drain from the drain body.

[0018] In said drawings, reference numeral 1 globally denotes a drain according to the invention in its entirety.

In the continuation of the description, the parts common to the various embodiments of the drain will be identified by the same reference numerals.

[0019] According to a general embodiment, the drain comprises a substantially cylindrical drain body 10 suitable for being housed in a hole made in a bath, washbasin, sink or the like. The body 10 terminates underneath with a bottom grid 12 and above with an annular flange 14 which defines the intake 16 for the passage of water to the drain body 10.

[0020] A plug 18 is lodged in the drain body 10 to open/close the intake 16 and thereby allow/prevent the passage of water to the drain pipe. The plug 18 comprises a plug body 20 and a head 22 bearing a sealing element 24 suitable for cooperating with the inner rim 14' of the annular flange 14 to hermetically seal the intake 16 when the head 22 of the plug is level with said flange.

[0021] Innovatively, the head 22 is axially movable in relation to the plug body 20 between a lowered position, wherein said head 22 is below the flange 14 to open the intake, and a raised position, wherein said head 22 is level with the flange 14 to hermetically seal the intake 16.

[0022] In other words, the plug 18 never protrudes above the annular flange 14, and therefore above the floor of the bath, sink or the like.

[0023] According to a preferred embodiment, the plug 18 is of the type with a trip movement, wherein the head 22 passes automatically, for example when thrust by an elastic element, from the lowered position to the raised position following pressure exerted manually upon it. Such type of plug is however known and does not require further detailed explanation herein.

[0024] According to a preferred embodiment, when the head 22 of the plug is in the raised position, the sealing

element 24 lies axially against its respective seat 26 made in the flange. For example, the sealing element 24 is an o-ring fitted on a respective annular seat 24' made in the side wall of the head 22. In one embodiment, the seat 26 made in the flange 14 is a concave shape facing downwards so as to define an axial abutment shoulder for the sealing element 24. Advantageously, when the head 22 of the plug is level with the annular flange 14, the upper surface of the head is aligned with that of the flange, so as to create a continuous and even surface.

[0025] According to a further aspect of the invention, the plug 18 is supported by the drain body by means of elastic overflow means. Such elastic means are calibrated so as to yield axially above a predefined level of pressure acting on the head 22 of the plug, so as to cause a lowering of the plug in relation to the drain body 10. Consequently, starting from a position of normal closure of the drain intake 16, the entire plug 18 translates axially downwards opening said intake 16 and thereby allowing the water to empty into the drainpipe.

[0026] The pressure acting on the head 22 contrasting the force opposed by the elastic elements is the hydrostatic pressure of water contained in the bath, sink or the like. The drain according to the invention therefore also acts as an overflow device.

[0027] In a first embodiment shown in figures 1-3, said yielding overflow device comprises an elastic element 30 by means of which the plug 18 rests on the bottom grid 12 of the drain body 10.

[0028] Consequently, once a maximum level of water has been established and the corresponding pressure value acting on the head 22 of the plug has been calculated, the contrasting force of the elastic element 30 is chosen so as to enable compression of the elastic element, and thereby lowering of the plug when such pressure value is reached or exceeded.

[0029] Advantageously, such overflow device is self regulating, in the sense that when the water level returns equal to or below the maximum threshold level, the plug 18 automatically returns to its initial position closing the intake 16, thrust upwards by the elastic element 30. In other words, the elastic element 30 also acts as a return mechanism to bring the plug into the raised position closing the intake 16 when the hydrostatic pressure exerted by the water on the plug falls below the pressure exerted by the elastic element 30 on the said plug.

[0030] Advantageously, moreover, the contrasting force of the elastic element 30, in other words its elastic constant, is adjustable, for example by a plumber, so as to choose the maximum level of water admissible.

[0031] According to one embodiment, the elastic element 30 is a spring, for example a helical spring, for example a conical helical spring.

[0032] The elastic element 30 is less rigid than the spring inside the plug.

[0033] In one preferred embodiment, the plug body 20 is connected underneath, for example by screwing, to a housing and guiding bush 32 of the elastic element 30.

[0034] More specifically, the bottom grid 12 of the drain body 10 comprises a tubular axial portion 34 which a guide stem 36 extending from the bottom of the bush 32 is inserted in so as to slide. Moreover, such tubular axial portion 34 defines above an annular support plane 38 of the elastic element 30.

[0035] In one embodiment variation shown in figures 4-11, the elastic overflow elements comprise magnetic overflow means, operatively connected to the plug 18 and to the drain body 10 and calibrated so as to yield over a predefined pressure value acting on the head 22 of the plug as to cause a lowering of the plug 18 in relation to the drain body 10. In this case too, consequently, starting from a position of normal closure of the drain intake 16, the entire plug 18 translates axially downwards, opening said intake 16 and thereby allowing the water to discharge towards the drain pipe.

[0036] Preferably, the magnetic overflow means comprise at least a first magnetic element 50 joined to either the plug 18 or the drain body 10, and a second magnetic or ferromagnetic element 52 joined to the remaining between the drain body 10 and the plug 18. Said elements 50, 52 are suitable for cooperating to enable/prevent the lowering of the plug 18.

[0037] The pressure acting on the head 22 contrasting the force of attraction between the first 50 and second 52 magnetic elements is the hydrostatic pressure of the water contained in the bath, sink or the like. Consequently, once a maximum level of water has been established and the corresponding pressure value acting on the head 22 of the plug has been calculated, the force of attraction of the magnetic overflow means is chosen so as to enable the reciprocal distancing of the magnetic elements 50, 52 and thereby the lowering of the plug, when such pressure value is reached or exceeded.

[0038] In other words, the lowering of the plug 18 occurs when the pressure value reaches or exceeds the force of reciprocal attraction between the magnetic elements 50, 52.

[0039] Preferably, the first magnetic element 50 is connected to the bottom grid 12, for example positioned in a special seat made inside it, and the second magnetic or ferromagnetic element 52 is connected to the plug 18.

[0040] Advantageously, such overflow device is self-regulating, in the sense that when the water level returns equal to or below the maximum threshold level defined, the plug 18 automatically returns to its initial position closing the intake 16, thrust upwards by the return means of the plug 18, for example elastic and/or magnetic.

[0041] The return means are therefore able to return the plug 18 to the position prior to lowering, when the pressure acting on the head 22 falls below the predefined value.

[0042] According to a preferred embodiment shown in figures 4-6, the plug 18 is supported on the bottom grid 12 by an elastic element 30. According to such embodiment, the return means comprise an elastic element 30.

[0043] Advantageously, moreover, the contrasting

force of the elastic element 30, in other words its elastic constant, is adjustable, for example by a plumber, so as to choose the maximum level of water admissible.

[0044] According to one embodiment, the elastic element 30 is a spring, for example a helical spring, for example a conical helical spring.

[0045] The elastic element 30 is less rigid than the spring inside the plug.

[0046] According to a preferred embodiment shown in figures 7-9, the return means of the plug 18 comprise a third magnetic element 54, joined to the drain body 10 and suitable for repelling the magnetic element 50, 52 joined to the plug 18.

[0047] Consequently, with reference to a lowered or overflow condition of the plug 18 (for example shown in figure 9), the first 50 and the second 52 magnetic elements are reciprocally distanced on account of the hydrostatic pressure of the water present in the bath, which acts on the head 22 of the plug. In such configuration, the magnetic element 52 joined to the plug is positioned near the third magnetic element 54, of the same polarity as that of the magnetic element 52, which therefore tends to repel the magnetic element 52 towards a raised (or closed) configuration of the plug.

[0048] Consequently, when the hydrostatic pressure exerted on the head 22 falls below the predefined value, the third magnetic element 54 repels the magnetic element 52 joined to the plug 18, so that the latter returns to the position prior to lowering (figure 5).

[0049] Preferably, the first 50 or second 52 magnetic element and the third magnetic element 54 are distanced along the grid wall 56 so as to axially define the stroke of the magnetic element 50, 52 joined to the plug 18.

[0050] In other words, the magnetic element 52 joined to the plug 18 is movable between a first configuration (shown in figure 8), in which it is in contact with the first magnetic element 50, and a second configuration (figure 7 or 9), in which the magnetic element 52 is positioned in correspondence with the third magnetic element 54.

[0051] According to one advantageous embodiment, the bottom grid 12 of the drain body 10 identifies an aperture which the guide stem 36 of the plug 18 is able to slide in. The guide stem 36 has a portion of free extremity 58, opposite the portion facing the head 22, bearing the magnetic element 50, 52 joined to the plug 18.

[0052] Preferably, the portion of free extremity 58 of the stem 36 extends into a compartment 60 defined by the grid wall 56.

[0053] As a result, during functioning of the drain 1, the guide stem 36 is axially mobile inside the compartment 60 defined by the wall 56.

[0054] Preferably, the compartment 60 can be closed, for example sealed tight, by means of a bottom plate 64 screwable to the grid wall 56.

[0055] In one preferred embodiment, the plug body 20 is connected underneath, for example by screwing, to a housing and guiding bush 32 of the elastic element 30.

[0056] More specifically, the bottom grid 12 of the drain

body 10 comprises a tubular axial portion 34 extending downwards from the bush 32 which the guide stem 36 is inserted in so as to slide. Moreover, such tubular axial portion 34 defines above an annular support plane 38 of the elastic element 30.

[0057] In a further embodiment variation shown in figures 10 and 11, an elastic return element 30' acting on the plug 18, for example on the magnetic element 52 borne by the guide stem 36 is placed on the bottom plate 64 sealing the compartment 60, instead of the third magnetic element 54,. For example, said elastic return element 30' is a cylindrical helical spring.

[0058] Said elastic return element 30' substantially performs the same function as the elastic return element 30 described for the embodiments of figures 1-6. Advantageously, the positioning of said elastic return element 30' inside the compartment 60, sealed by the removable bottom plate 64, makes it possible to rapidly and easily vary the recoil strength exerted by said elastic element, by simply removing the bottom plate 64 from the grid wall 56 and inserting one or more spacers 70 able to increase the compression of the spring 30' between said spring 30' and the bottom plate 64.

[0059] The drain thus conceived of makes it possible to avoid making a lateral hole and connecting said hole to the drain pipe. Thereby, the drawbacks of the overflow devices of the prior art complained of above are brilliantly overcome.

[0060] According to one advantageous embodiment, a guide element 40 able to slide along the walls of the drain body 10 is joined to the plug 18.

[0061] Moreover, in a preferred embodiment the annular flange 14 is detachably connected to the drain body 10, for example by screwing, so as to allow the extraction of the plug 18 and access to the bottom grid 12.

[0062] Figure 12 shows a specially configured tool 80 for unscrewing the annular flange 14 from the drain body 10. Said tool 80 is in the shape of a fork comprising a pair of elastic arms 82 suitable for being inserted in the intake 16 of the drain when the plug 18 is in the lowered position, so as to engage the inner rim 14' of the annular flange. To such purpose, the elastic arms 82 end in an appendage 84 counter-shaped to said inner rim 14'. The latter has at least one circumferential shoulder 14", preferably two, diametrically opposite, against which an appendage 84 of an arm 82 abuts. This way, by rotating the tool 80, the annular flange 14 is unscrewed from the drain body 10.

[0063] A person skilled in the art may make adaptations, and replace elements with others functionally equivalent, to the embodiments of the drain according to the invention so as to satisfy contingent requirements, while remaining within the sphere of the following claims. Each of the characteristics described as belonging to a possible embodiment may be realised independently of the other embodiments described.

Claims

1. Drain (1) for baths, sinks, washbasins and the like, comprising:
 - a drain body (10) terminating at the bottom with a bottom grid (12) and at the top with an annular flange (14) which defines the intake (16) for the passage of the water in the drain body (10);
 - a plug (18), lodged in said drain body (10) and comprising a plug body (20) and a head (22) suitable for cooperating with the flange (14);

characterised by the fact that said head (22) is axially movable in relation to said body between a lowered position, wherein said head (22) is below the flange (14) to open the intake (16), and a raised position, wherein said head (22) is level with the flange (14) to close the intake (16).
2. Drain (1) according to claim 1, wherein the head (22) of the plug trips from the lowered position to the raised position following pressure exerted on it.
3. Drain (1) according to claim 1 or 2, wherein the head (22) bears a sealing element (24) suitable for cooperating with an inner rim (14') of the annular flange (14) to seal said intake (16) hermetically when the head (22) of the plug (18) is level with said flange (14).
4. Drain (1) according to any of the previous claims, wherein, when the head (22) of the plug is in the raised position, the sealing element (24) lies axially against a respective seat (26) made in the flange (14).
5. Drain according to any of the previous claims, wherein the plug (18) is supported by the drain body by means of the elastic overflow means (30, 50, 52, 30') calibrated so as to yield above a predefined level of pressure acting on the head of the plug so as to cause a lowering of the plug in relation to the drain body.
6. Drain according to claim 5, wherein said elastic overflow elements exert on the plug (18) a contrasting force less than that needed to cause the lowering of the head (22) in relation to the plug body (20).
7. Drain (1) according to any of the previous claims, comprising, in addition, magnetic overflow means, operatively connected to the plug (18) and calibrated so as to yield when a predefined pressure value acting on the head (22) of the plug is exerted so as to cause a lowering of the plug (18) in relation to the drain body (10).
8. Drain (1) according to claim 7, wherein the magnetic overflow means comprise at least a first magnetic element (50) joined to either the plug (18) or the drain body (10), and a second magnetic or ferromagnetic element (52) joined to the other, out of the drain body (10) and plug (18), said elements (50, 52) being suitable for cooperating to enable/prevent the lowering of the plug (18).
9. Drain (1) according to any of the claims 5-8, comprising, in addition, return means (30, 54, 30') of the plug (18), for example elastic and/or magnetic, which are suitable for returning said plug (18) to the position prior to lowering, when the pressure acting on the head (22) falls below the predefined value.
10. Drain (1) according to claim 9, wherein the plug (18) rests on the bottom grid (12) by means of an elastic element (30), for example a helical spring, and wherein the return means comprise said elastic element (30).
11. Drain according to claim 10, wherein the plug body is connected underneath to a housing and guiding bush (32) of the elastic element (30).
12. Drain according to claim 11, wherein the bottom grid (12) of the drain body comprises a tubular axial portion (34) which a guide stem (36) extending downwards from said bush (32) is inserted in so as to slide.
13. Drain according to claim 12, wherein said tubular axial portion defines above an annular support plane for the elastic element (30).
14. Drain (1) according to any of the claims 9-13, wherein the return means of the plug (18) comprise a third magnetic element (54), joined to the drain body (10) and able to repel the magnetic element (50, 52) joined to the plug (18).
15. Drain (1) according to any of the claims 8-14, wherein the bottom grid (12) of the drain body (10) identifies an aperture which the guide stem (36) of the plug (18) is able to slide in, a portion of free extremity (58) of said stem (36) bearing the magnetic element (50, 52) joined to the plug (18).
16. Drain (1) according to any of the previous claims, wherein the bottom grid (12) of the drain body (10) identifies an aperture which the guide stem (36) of the plug (18) is able to slide in, the portion of free extremity (58) of the stem (36) extending into a compartment (60) defined by a grid wall (56) and sealed underneath by a detachable bottom plate (64).
17. Drain (1) according to claim 16, wherein an elastic return element (30') acting on the plug (18) is placed in said compartment

18. Drain according to any of the claims 5-17, wherein the contrasting force exerted on the plug by the elastic overflow means is adjustable.
19. Drain according to any of the claims 9-18, wherein said return means comprises a helical spring. 5
20. Drain (1) according to any of the previous claims, wherein a guide element (40) able to slide along the walls of the drain body (10) is joined to the plug (18). 10
21. Drain (1) according to any of the previous claims, wherein the flange (14) is detachably connected to the drain body (10) so as to allow extraction of the plug (18). 15

20

25

30

35

40

45

50

55

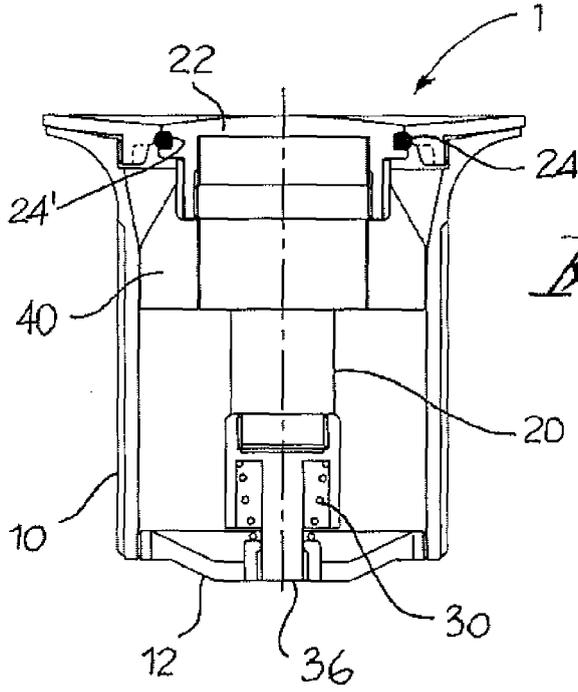


Fig. 2

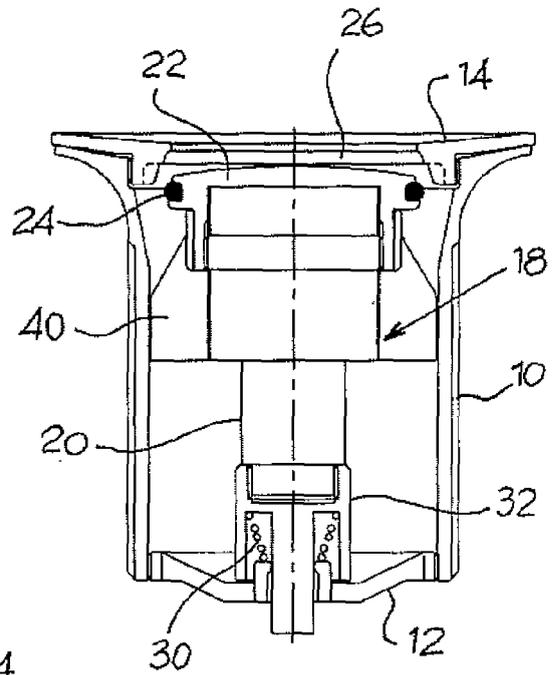


Fig. 3

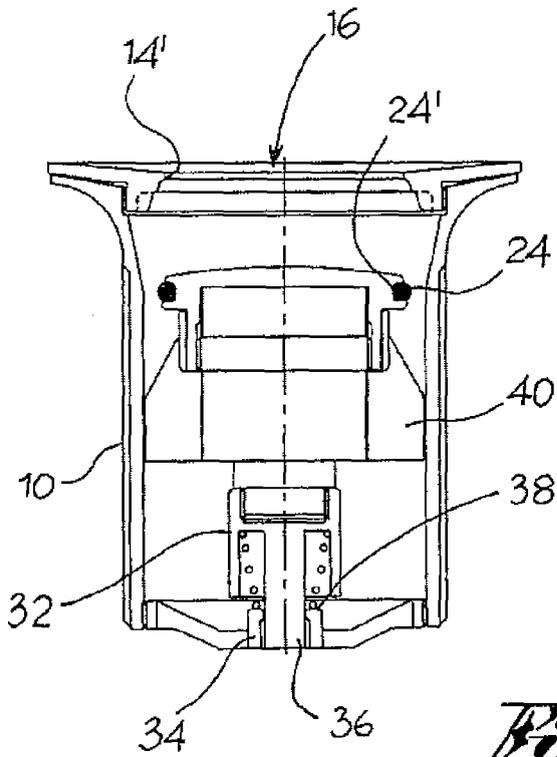


Fig. 1

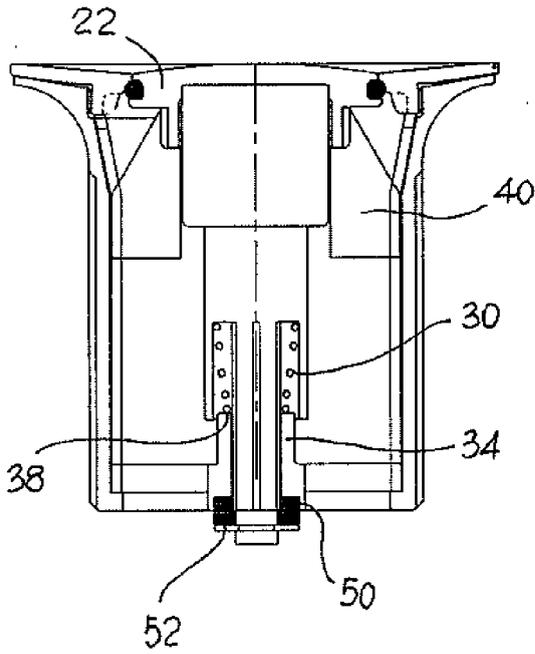


Fig. 5

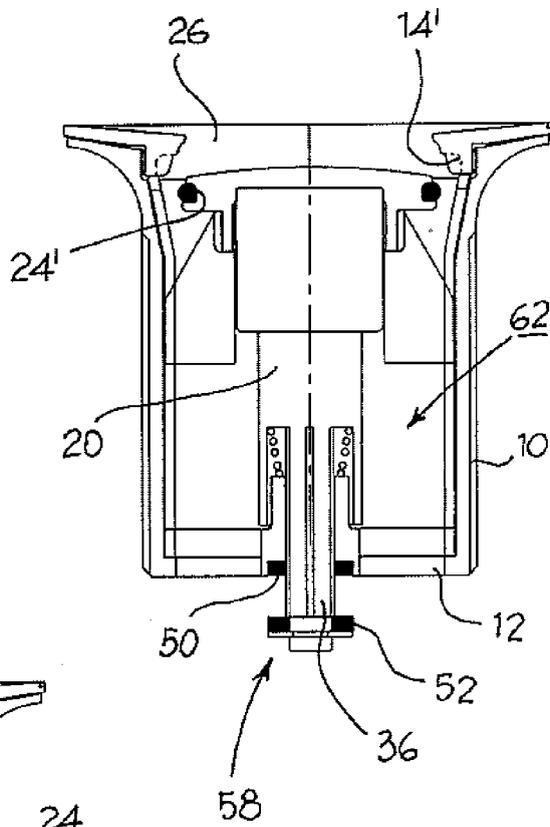


Fig. 6

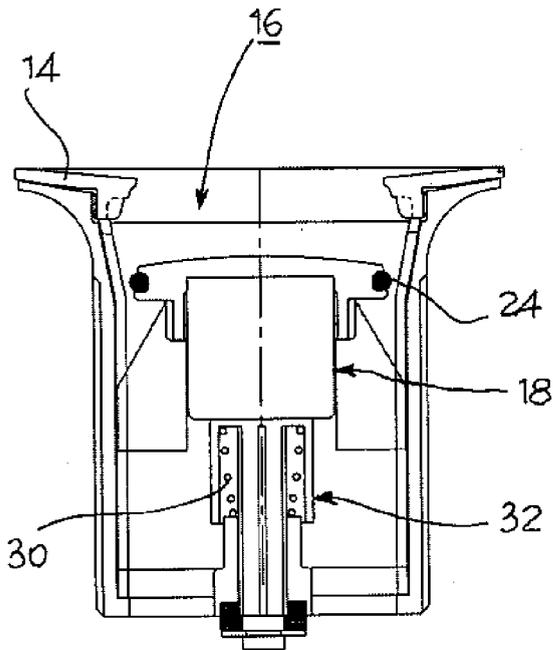


Fig. 4

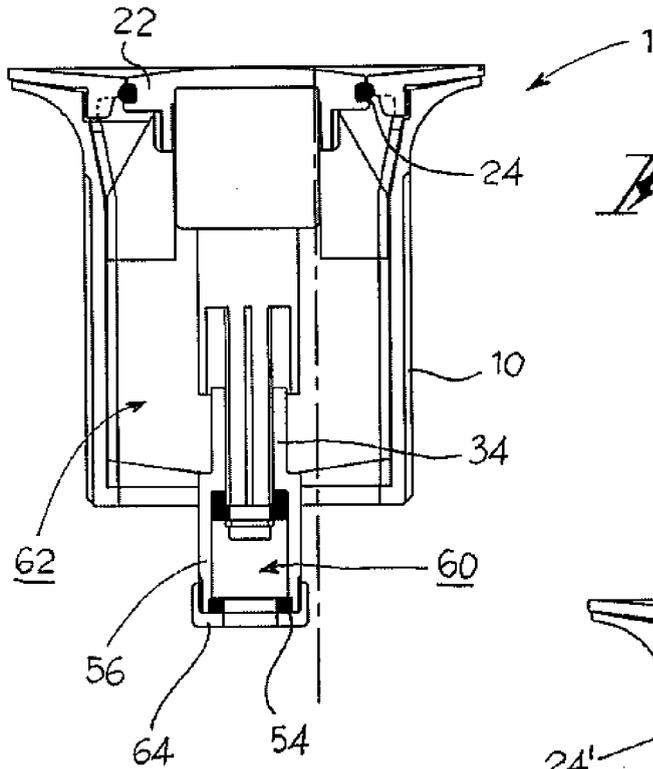


Fig. 8

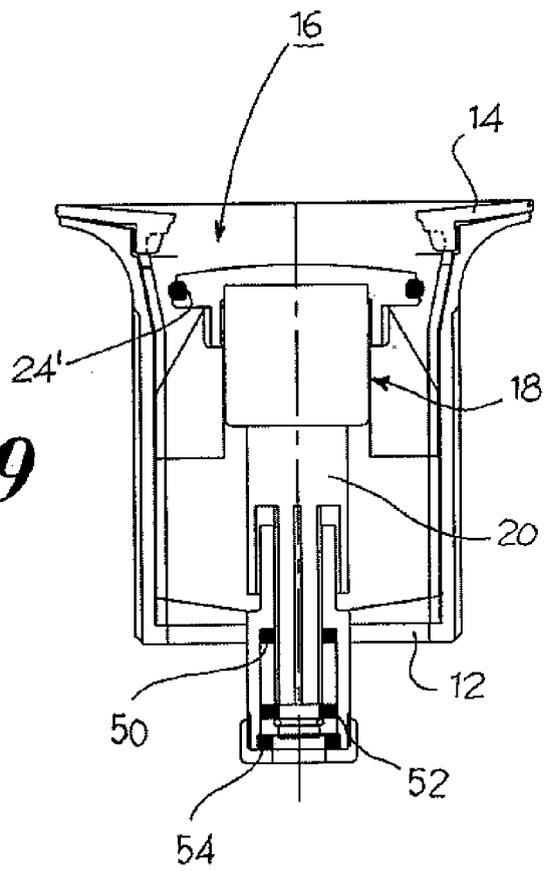


Fig. 9

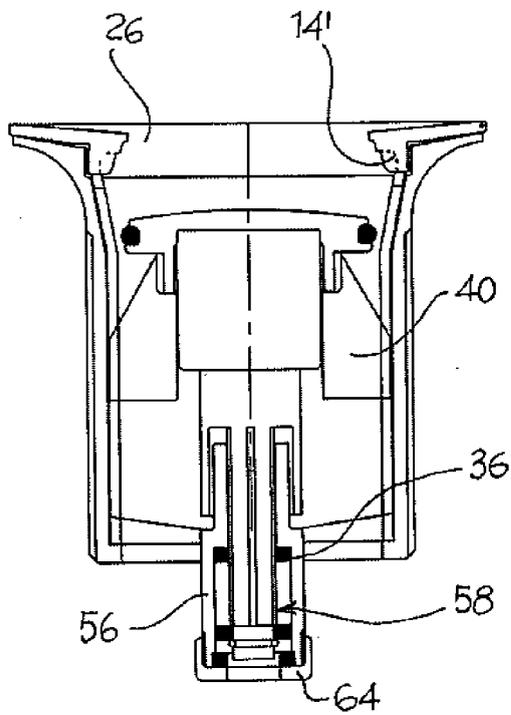
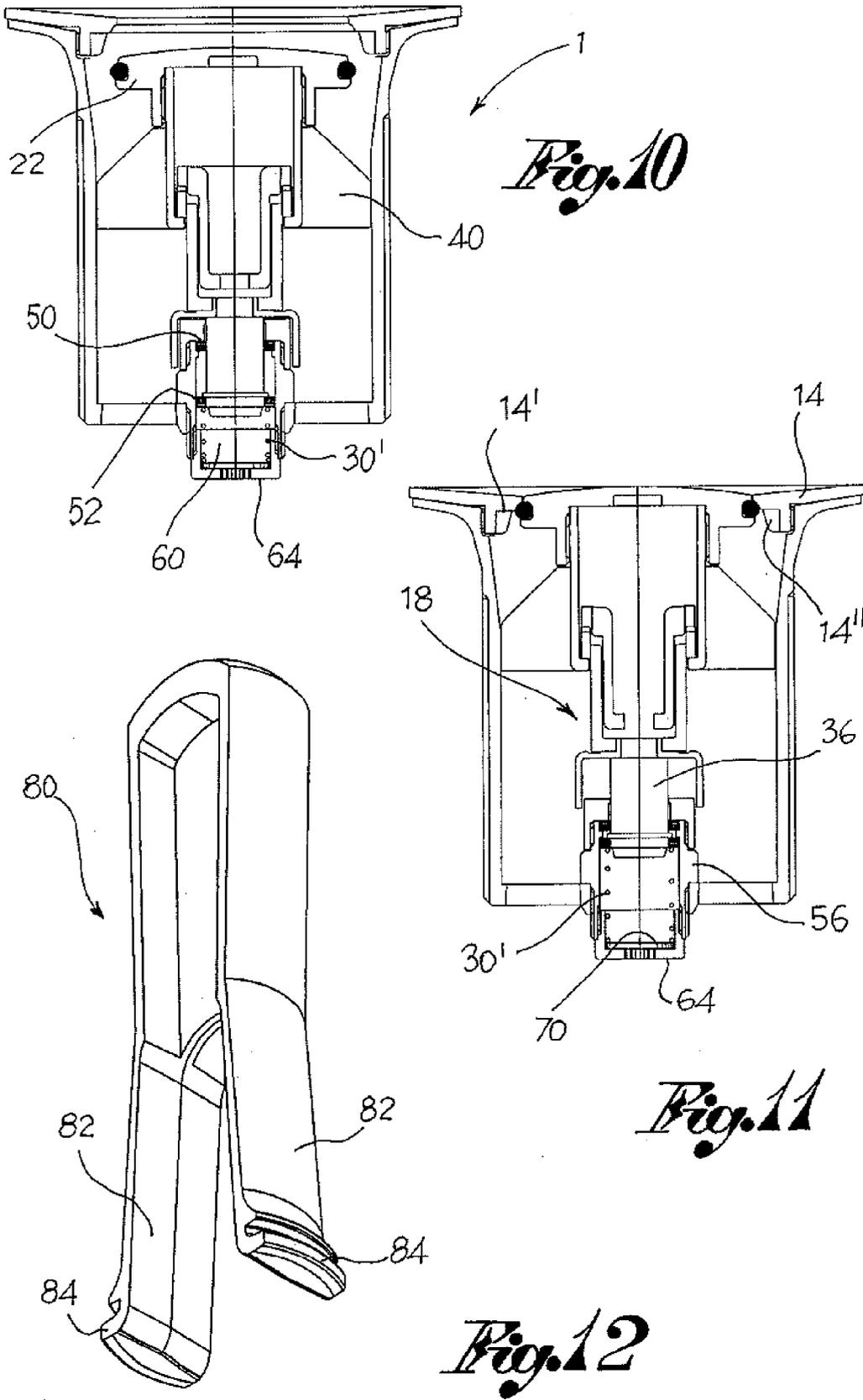


Fig. 7





EUROPEAN SEARCH REPORT

Application Number
EP 10 16 4527

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 91/16847 A1 (JATTKE UDO [AU]; LEWIS MITCHELL LEE [AU]) 14 November 1991 (1991-11-14)	1-5, 9-13, 15-21	INV. E03C1/232
Y	* pages 7-10; figures 1-5 * -----	7,8,14	
Y	WO 2008/011240 A2 (FLEETGUARD INC [US]; THOMAS CHAD M [US]; TRUE-DAHL ABBY [US]; HERMAN P) 24 January 2008 (2008-01-24) * paragraph [0018] - paragraph [0022]; figures 1-5 * -----	7,8,14	
Y	GB 2 416 822 A (BOC GROUP PLC [GB]) 8 February 2006 (2006-02-08) * pages 3-6; figures 2,3 * -----	7,8,14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E03C
Place of search		Date of completion of the search	Examiner
Munich		12 October 2010	Horst, Werner
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	

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 16 4527

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-10-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9116847 A1	14-11-1991	EP 0531316 A1 JP 5507008 T	17-03-1993 14-10-1993
-----	-----	-----	-----
WO 2008011240 A2	24-01-2008	CN 101460772 A DE 112007001431 T5 US 2008017256 A1	17-06-2009 28-05-2009 24-01-2008
-----	-----	-----	-----
GB 2416822 A	08-02-2006	NONE	
-----	-----	-----	-----

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82