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(54) Closure device, particularly for drains

(57) A closure device, particularly for drains comprising a conical body (2) and a cage-like element (3), and which comprises a closure plug (7), that can be sealingly associated with each other at the bottom of a container. The device comprises a first pneumatic actuation unit that can be operated by the user at a distance from the drain plug. The first unit actuates at least one second actuation unit that allows to selectively close or open the plug (7). The actuation of the plug (7) is effective, and requires a very small number of components that have a modest bulk and low cost.

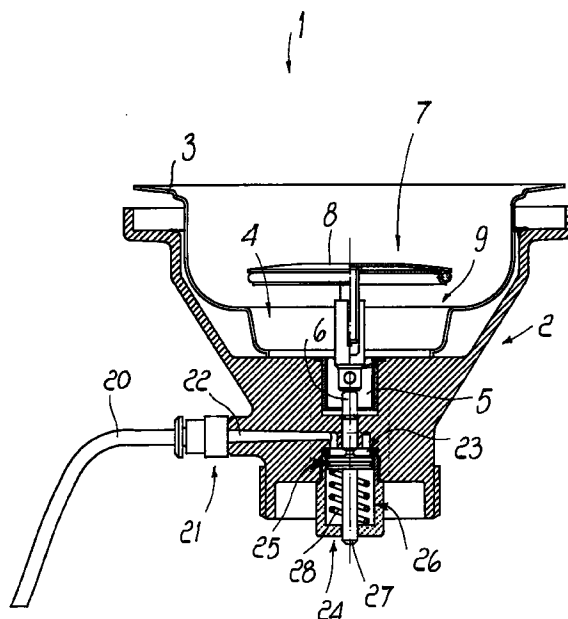


Fig.1

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Description

The present invention relates to a closure device particularly for drains.

Nowadays mechanical devices that allow to close and open plugs of tubs, sinks, or other containers for water or liquids contained therein are used.

Some of these devices, applied for example to tubs, consist of a knob which can be operated by the user; the rotation of said knob directly lifts or lowers the plug at a cage-like element that is sealingly associable with a conical body at the drain of the tub.

A similar mechanical system is used in sinks, requiring the movement of a rod which in turn can move the plug vertically.

These conventional devices, however, must have different sizes according to the specific type of sink or tub with which they are associated, consequently increasing their manufacturing and storage costs.

Moreover, said conventional devices cannot be used for containers that may hold corrosive and toxic liquids, as it may be necessary to dip into the liquid and directly access the plug or the drain of the container.

Accordingly, it is known to use devices in which the plug is opened by using flexible cables that can be placed inside a flexible sheath and are actuated by means of linear buttons or rotating knobs.

These conventional devices, too, have drawbacks caused by the fact that they comprise a large number of parts that can in turn be damaged and unavoidably entail a high cost.

Furthermore, said devices are considerably bulky and mechanically complicated, forcing the manufacturer to provide a series of transmissions of various lengths depending on the application, with considerable effort of the installer.

The aim of the present invention is therefore to thus eliminate the described technical problems, thus solving the drawbacks of the prior art, by providing a device that allows to close plugs of containers for water or liquids, including corrosive and toxic liquids, from a distance, therefore without dipping into the liquid to directly access the drain of the container, and is structurally simple and can be manufactured with a small number of components.

Within the scope of this aim, an important object is to provide a device that has a limited bulk and can be installed easily.

Another important object is to provide a device that is structurally simple and can be applied so as to allow activation at the desired distance from the drain so as to always allow easy installation and easy activation on the user's part.

Another object is to provide a device that limits the number of parts that the manufacturer has to store.

Another object is to provide a device that associates with the preceding characteristics those of having low manufacturing costs and of being easy to maintain.

This aim, these objects, and others which will become apparent hereinafter are achieved by a closure device, particularly for drains comprising a conical body and a cage-like element, which comprises a closure plug, that can be sealingly associated with each other at the bottom of a container, characterized in that it comprises a first pneumatic actuation unit that can be operated by the user and actuates at least one second actuation unit for selectively closing or opening said plug.

Further characteristics and advantages of the invention will become apparent from the detailed description of a particular but not exclusive embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a sectional view of a first pneumatic actuation device that constitutes the device;

figure 2 is a sectional view of the second actuation unit that constitutes the device, associated to the drain;

figure 3 is a sectional view of a different embodiment of the second actuation unit.

With reference to the above figures, the reference numeral 1 generally designates a drain that comprises a conical body 2 that can be associated below the drain hole of a container, such as a tub or a sink, with which it is possible to associate sealingly, by means of appropriate gaskets, a cage-like element 3 provided with a first hole 4, the axis whereof coincides with the axis of a second hole 5 that is formed axially on the body 2 and is adapted to accommodate the stem 6 of a plug 7 the head 8 whereof can sealingly seal an adapted first seat 9 formed on the cage-like element 3.

The closure device is also constituted by a first pneumatic actuation unit 10, which is placed in a region that is handy for the user at a desired distance from the drain 1.

Said first unit 10 comprises a knob 11 that can be accessed by the user; its stem 12 is rotatably associated at a suitable container 13, with which it is possible to associate, on the opposite side with respect to the knob 11, a hollow element 14 having at least one discharge duct 15.

Suitable cylinders 16 are inserted within said container 13 and said hollow element 14; a positive cam 17 and a suitable pair of pistons 18 are formed therein.

Said pistons slide sealingly within the hollow element 14, forming an air injection or suction chamber that is connected to the discharge duct 15.

When the knob 11 is turned, the cylinders 16, by means of the cam 17, turn, for example, clockwise, actuating the pair of pistons 18, for example with a sequence that moves a first piston downward, then a second piston downward, then the first piston upward, and then the second piston upward.

An optional reverse direction of the rotation of the knob 11 will entail a reversed sequence.

The shape of the cam 17 also allows to keep the first and second pistons in the lowered position (which lies between the position in which the piston 2 is directed downward and the piston 1 is directed upward) even in the presence of forces that may tend to move the pair of pistons 18 upward.

One or more hoses 20 are associated with the discharge duct 15 by virtue of suitable engagement means 19; said hoses can in turn be associated, at their other end, with additional engagement means 21 that are connected to a delivery duct 22 formed below the body 2.

Said delivery duct 22 is connected to a chamber 23 which is obtained by associating a second cylinder 24 below and axially to the body 2. The head 25 of a piston 26 slides sealingly within said second cylinder 24, and the stem 27 of said piston 26 slides at a suitable axial hole formed on the second cylinder 24. A spring 28 is arranged coaxially to said stem 27.

The stem 6 of the plug 7 is connected to the chamber 23 and lies above, or is associated with, the head 25 of the piston 26.

The operation of the device is thus as follows: the spring 28 arranged coaxially to the stem 27 of the piston 26, in the absence of pneumatic pressure inside the chamber 23, keeps the head 8 of the plug 7 raised with respect to the first seat 9, thus allowing to discharge the content of the tub or sink.

A rotation of the knob 11 entails, for example, the downward movement of the pair of pistons 18, thus compressing the air that flows, through the discharge duct 15 formed on the element 14 and the hoses 20, into the delivery duct 22, pushing the piston 26 downward.

In this manner, the plug 7 moves downward, preventing the discharge of the liquid; the descent of the plug 7 occurs by gravity or by connection to the head 25 of the piston 26.

When the pressure returns to the initial conditions, and therefore once the knob 11 has been turned further, the spring 28 returns the plug 7 upward, allowing the liquid to flow out.

It has thus been observed that the invention has achieved the intended aim and objects, a device having been provided that allows to remotely close drains and is constituted by a limited number of components that are simple to apply and have a low cost.

The invention is therefore structurally very simple; the first actuation unit can be placed at the desired distance with respect to the second unit, and it is sufficient to merely connect the two units by means of a conventional hose, which can even follow long and/or convoluted paths without altering the activation of the device.

The closure device according to the invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept.

Thus, for example, figure 3 illustrates another embodiment of the second unit, wherein the second cylinder 124 is formed radially with respect to the axis of body 102 and thus protrudes approximately at right angle to the stem 106 of the plug 107.

A chamber 123 is again formed inside the second cylinder 124 and acts as seat for the hermetic sliding of the head 125 of the piston 126, the stem 127 whereof is connected to a first wing 129 of a lever 130 which is substantially V-shaped and is pivoted, approximately at the intersection between the first wing 129 and a second wing 131, to a pivot 132 that is rigidly coupled to the body 102.

The second wing 131 lies below the stem 106 of the plug 107, or is directly connected to it, so as to allow to easily open and close the plug 107 like the previous embodiment.

The materials and the dimensions that constitute the individual components of the device may of course be the most pertinent according to the specific requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

Claims

1. Closure device, particularly for drains comprising a conical body (2) and a cage-like element (3), which comprises a closure plug (7), that can be sealingly associated with each other at the bottom of a container, characterized in that it comprises a first pneumatic actuation unit (10) that can be operated by the user and actuates at least one second actuation unit for selectively closing or opening said plug (7).
2. Device according to claim 1, characterized in that said first pneumatic actuation unit (10) comprises at least one knob (11), the stem (12) whereof is rotatably associated within a container (13) with which a hollow element (14) is associated on the opposite side with respect to said knob (11), said hollow element (14) having a discharge duct (15) in a downward region.
3. Device according to claims 1 and 2, characterized in that means (16,17,18) for pumping a fluid, preferably air, are inserted in said container (13) and said hollow element (14), said fluid being pumped through said discharge duct (15) to said second unit by means of at least one adapted hose (20) which is associable with said discharge duct (15).
4. Device according to claims 1 and 3, characterized in that said means for pumping comprise rotating cylinders (16) that are provided with a positive cam

(17) and a pair of pistons (18) that can slide axially and sealingly within said hollow element (14) that forms a chamber for injecting or drawing said fluid in said discharge duct (15).

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5. Device according to claims 1 and 4, characterized in that said hose (20) is associable with a second delivery duct (22) formed below said conical body (2).

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6. Device according to claims 1 and 5, characterized in that said second actuation unit comprises said second delivery duct (22), which is connected to the upper end of a chamber (23) which is obtained by associating a second cylinder (24) below said conical body (2) and axially thereto, the head (25) of a piston (26) sliding sealingly inside said second cylinder (24), the stem (27) of said piston (26) sliding at an adapted axial hole formed on said second cylinder (24).

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7. Device according to claims 1 and 6, characterized in that a spring (28) is arranged coaxially to the stem (27) of said piston (26) and is adapted to force its head (25) upward in the absence of the pressure of said fluid in said chamber (23).

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8. Device according to one or more of the preceding claims, characterized in that the stem (6) of said plug (7), which passes within a first hole (4) and a second hole (5) formed on said conical body (2) and said cage-like element (3), is connected to said underlying chamber (23) formed in said second cylinder (24), said stem (6) lying above, or being associated with, said head (25) of said piston (26).

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9. Device according to claims 1 and 4, characterized in that said positive cam (17) has a shape that allows to keep said pair of pistons (18) in a low position even in the presence of forces that tend to move said pair of pistons (18) upward.

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10. Device according to one or more of the preceding claims, characterized in that said second cylinder (124) is formed radially with respect to said body (102) and thus protrudes approximately at right angles to said stem (106) of said plug (107).

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11. Device according to claims 1 and 10, characterized in that a chamber (123) is formed in said second cylinder (124) and acts as seat for the hermetic sliding of the head (125) of said piston (126), the stem (127) of said piston (126) being connected to a first wing (129) of a lever (130) that is substantially V-shaped and is pivoted, approximately at the intersection between said first wing (129) and a second wing (131) of said lever (130), to a pivot (132) that is rigidly coupled to said body (102).

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12. Device according to claims 1 and 11, characterized in that said second wing (131) is arranged below, or is directly connected to, said stem (106) of said plug (107).

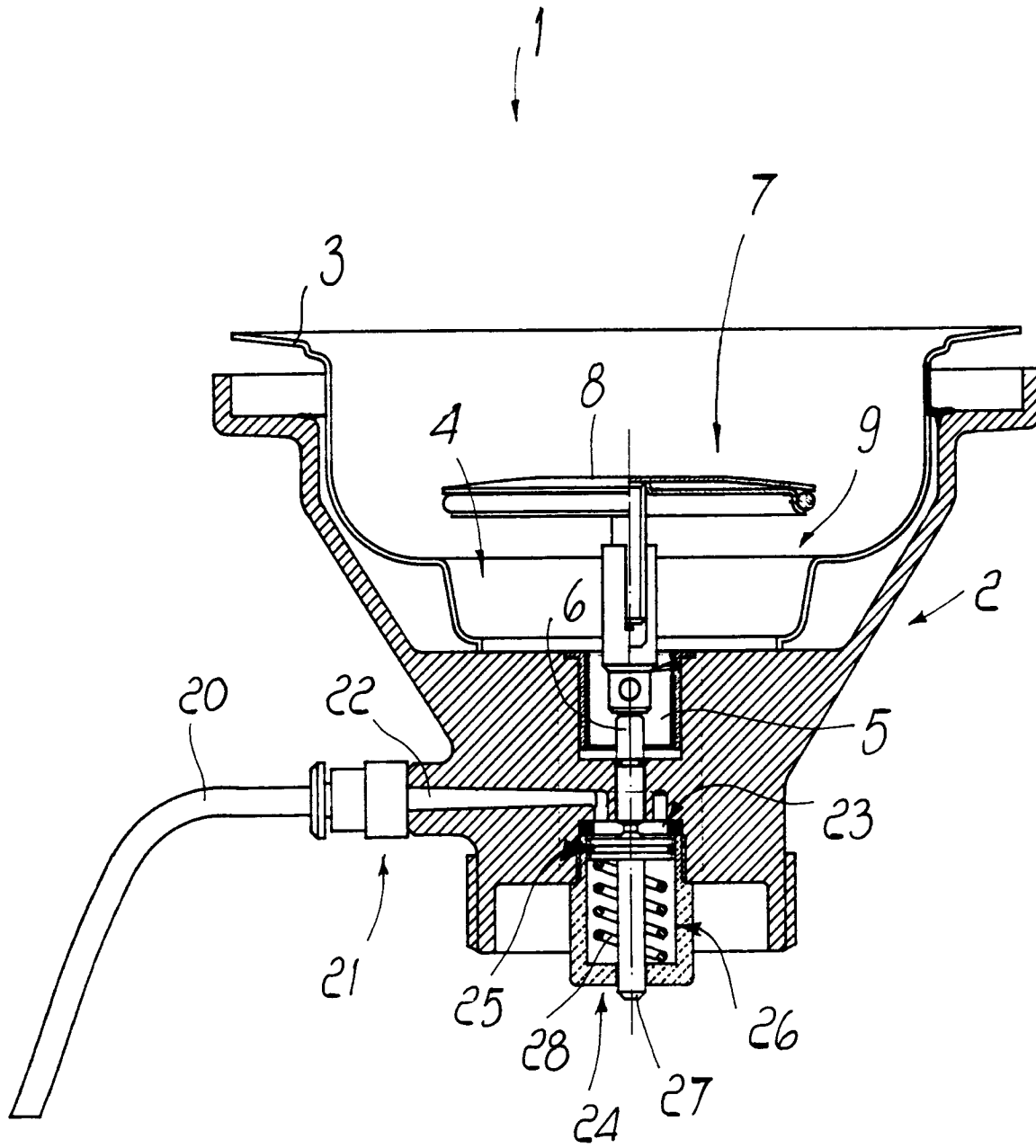


Fig. 1

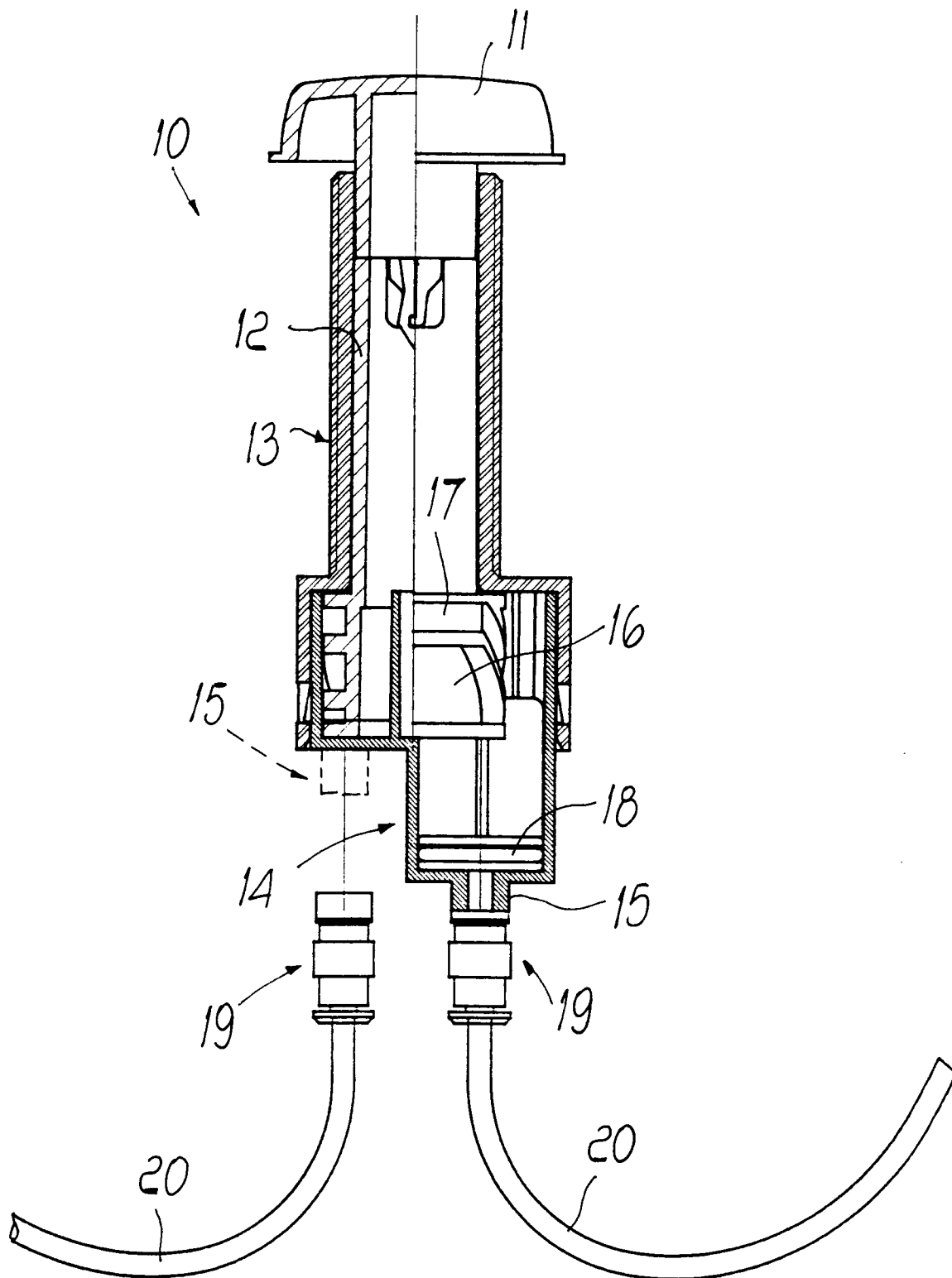


Fig. 2

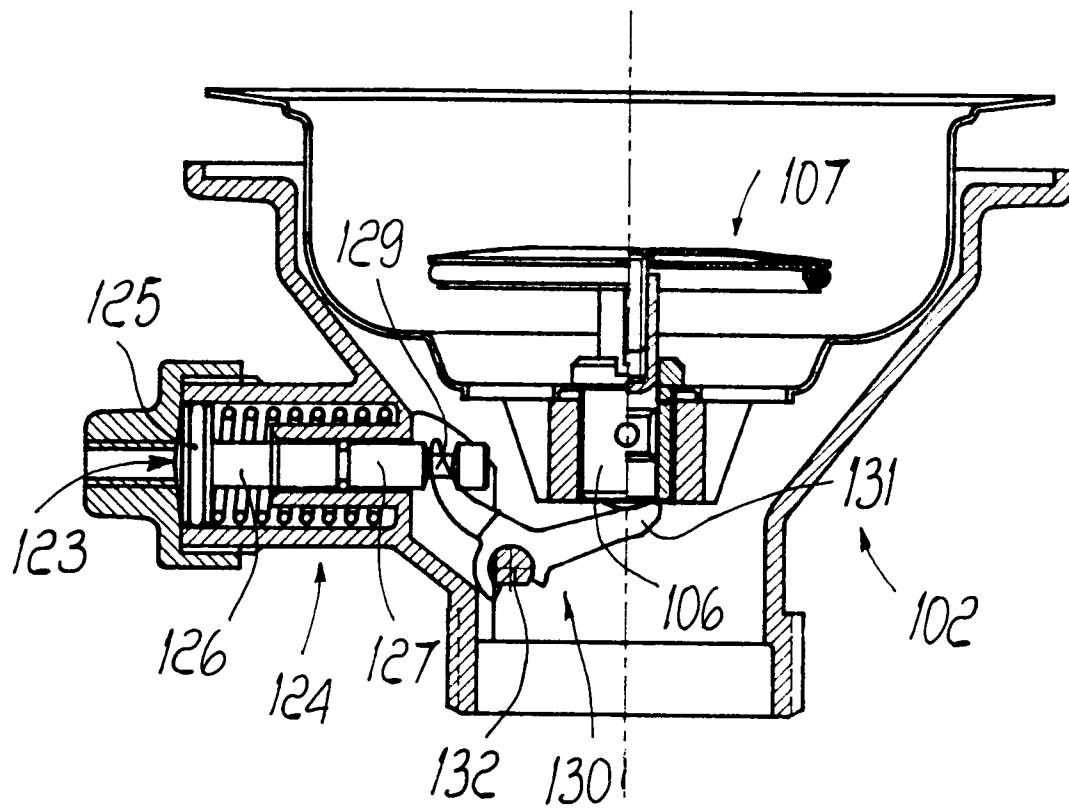


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 4645

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	WO-A-91 16847 (LEWIS) * page 11, line 26 - page 13, line 15; figures 4,5 *	1,6-8	E03C1/23
X	FR-A-2 391 329 (FRIEDRICH GROHE ARMATURENFABRIK G.M.B.H. & CO.) * page 2, line 8 - line 27; figure *	1,6-8	
X	AU-D-6 615 781 (MCKAY) * page 4, line 1 - page 6, line 20; figures *	1,6-8	
A	DE-A-42 41 023 (DEMANDT) * column 2, line 5 - column 3, line 4; figures 1,2 *	1,6-8	
A	FR-A-2 064 923 (HAZARD) * page 1, line 38 - page 3, line 11; figures 1-3 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E03C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 8 September 1995	Examiner De Coene, P
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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