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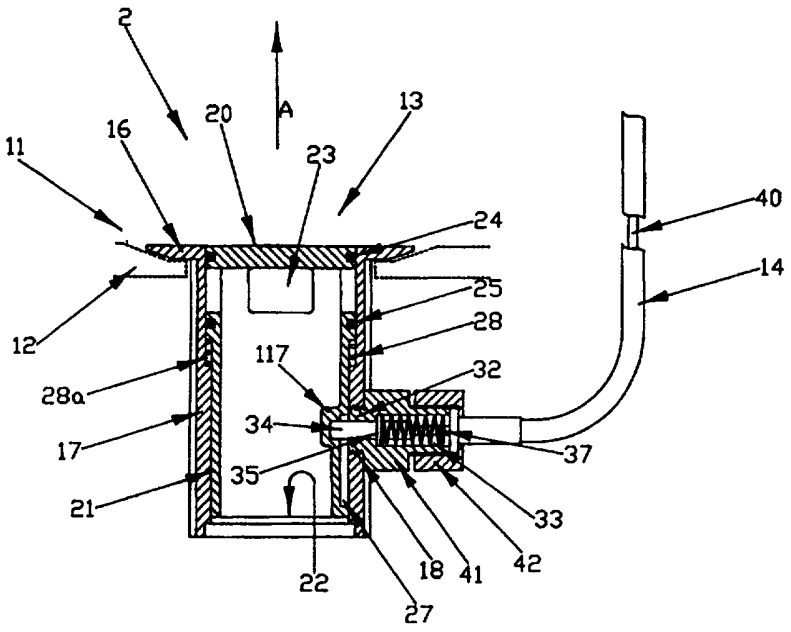
(54) Title: REMOTELY OPERATED PLUG



(57) Abstract

The invention relates to an improved remotely operated plug assembly (13) of the type with a pop-up plug (13) and cabling (14), wherein the inter-engaging means and the means for retaining the plug (13) in the drain (11) and in the closed position are circumferential. This allows the free movement of fluid from the plug (13) to the drain (11). The improvement relates to the use of common elements for both the inter-engaging means and the retaining means so that the one movable pin (34) acts in both the inter-engagement of the plug (13) and the drain (11), and the retention of the plug (13) within the drain (11) and in the closed position.

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TITLE: REMOTELY OPERATED PLUG

Technical Field

The present invention relates to improvements to the mechanism for the operation of remotely operated plugs for commercial or domestic baths, sinks or basins.

Background Art

Remotely operated plugs to open and close plugs, drains and sinks are known. Most known systems require support means or releasing opening and closing means that are essentially situated under the plug and are centrally located within the drain of the sink or basin. Improvements over these methods can be found in PCT/NZ96/00031 in which an alternative assembly is disclosed. A problem with this assembly has been found in that the sink unit and drain both require two sets of holes, one for location of a pin for retaining the plug within the drain unit whilst in operation or whilst open or closed, the second being for the remotely activated pin (34) which is part of the mechanism to release the plug from the closed position and to retain the plug in the closed position, after the plug has been closed.

An object of the present invention is to combine these two mechanisms and simplify the operation of the plug.

Summary of Invention

The present invention provides an improved remotely operated plug assembly for a sink or basin with a drain, said plug assembly including:

a sink waste unit secured within said drain, which includes a drain pipe;

a plug unit movably and releasably secured within said drain, said plug unit including a plug with a closed top and sides with holes formed therein, said plug unit being movably secured within the drain by an inter-engaging means which permits vertical movement of said plug unit within said drain, between an opened and a closed position and vice-versa, but which does not permit the removal of said plug from said drain under ordinary operating conditions, and which incorporates spring means to bias said plug to the open position, said open position being a position in which said holes are open to said sink or basin, and said closed position being a position in which said closed top is substantially flush with the top of said sink waste unit;

an opening mechanism situated remotely from said drain and plug unit and connected by cabling to a retaining mechanism, said opening mechanism including an opening means to

move and retain one end of said cabling;

a retaining mechanism, to keep said plug unit in the closed position, includes spring-biased means to release said retaining mechanism to allow said plug to move to the open position;

means for enabling the plug to be physically removed from said drain and replaced therein; wherein

the plug is capable of movement between an open and a closed position by manual depression of said plug, and between a closed and an open position by operation of said remotely placed opening mechanism to release the retaining mechanism via the cabling; and wherein

said inter-engaging means and said retaining means have common elements which are circumferentially situated within said drain pipe or about said drain pipe.

The present invention further provides a plug unit for a sink or basin with a drain, said plug unit being remotely operated and being movably and releasably secured within a drain pipe, said unit including:

a plug with a closed top and sides with holes formed therein, said plug unit being movably secured within the drain by an inter-engaging means which permits vertical movement of said plug unit within said drain, between an opened and a closed position and vice-versa, but which does not permit the removal of said plug from said drain under ordinary operating conditions, and which incorporates spring means to bias said plug to the open position, said open position being a position in which said holes are open to said sink or basin, and said closed position being a position in which said closed top is substantially flush with the top of said sink waste unit;

an opening mechanism situated remotely from said drain and plug unit and connected by cabling to a retaining mechanism, said opening mechanism including an opening means to move and retain one end of said cabling;

a retaining mechanism, to keep said plug unit in the closed position, includes spring-biased means to release said retaining mechanism to allow said plug to move to the open position;

means for enabling the plug to be physically removed from said drain and replaced therein; wherein

the plug is capable of movement between an open and a closed position by manual depression of said plug, and between a closed and an open position by operation of said remotely placed opening mechanism to release the retaining mechanism via the cabling; and

wherein

said inter-engaging means and said retaining means have common elements which and are circumferentially situated within said drain pipe or about said drain pipe.

Brief Description of the Drawings

By way of example only preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings in which:-

Fig. 1 is a section view of the plug end of a remotely operated plug showing a first preferred embodiment of the present invention, with the plug in the closed position;

Fig. 2 is a section view of a remotely operated plug showing a second preferred embodiment of the present invention, with the plug in the closed position; and

Fig. 3 is a section view along the line AA in Fig. 2.

Best Mode for Carrying Out the Invention

Referring to the drawings, Fig. 1 shows a first preferred embodiment of the present invention which is part of a remotely operated plug unit 2. The elements of the remotely operated plug 2 incorporate a drain 11 fitting into the base of a standard basin or sink 12. The drain 11 incorporates a plug unit 13. The plug unit 13 is connected by cabling 14 to a remotely operating unit of known type.

The drain 11 is a standard type with a flange 16 which sits in a specially moulded portion of the sink 12 or slightly proud of the surface of the base 12 of the sink adjacent the opening for the drain. The cylindrical sides 17 of the drain 11 are screw-threaded on the outside, in known manner. The plug unit 13 incorporates a top 20, sides 21 and bottom 22. The outer portions of the sides 21, adjacent the top 20, are slotted with draining holes 23. The draining holes 23 may be of approximately rectangular or square shape. Alternatively, the holes 23 may be slots, sufficient for water to drain through. Positioned either side of the draining holes 23, on the circumference of the sides 21, are two O-rings 24, 25. O-rings 24, 25 are positioned in respective grooves, in order that they provide a seal between the sides 17 of the drain 11 and the sides 21 of the plug 13.

Thus waste water drains from the sink through holes 23, into the interior of the plug 13, and out the bottom 22 into the drain pipe below the plug 13.

A spring 28, of a diameter approximately equal to that of the plug 13 is positioned between the plug 13 and the sides 17 of the drain unit 11. With the plug 13 in the closed position, the spring 28 is tightly wound in a small cavity 28a. It will be appreciated that when

the plug 13 is in the open position, the size of the cavity 28a will be increased and the spring 28 will not be under such tension.

One side 17 of the plug unit 13 includes a screw-threaded hole 18. The hole 18 receives therein an externally screw-threaded collar 32. The collar 32 is formed integrally with or is permanently secured to a nut 41. Both the collar 32 and nut 41 are hollow internally to receive therethrough a pin 34. An additional end collar 42 (threaded onto nut 41) secures within the hollow a second spring 37. The second spring 37 operates within a chamber 33. A flanged end 35 of the pin 34 operates to retain the second spring 37 within the chamber 33. The second spring 37 operates against the inside of the nut 41 in addition to the flange 35 of the pin 34.

The second end of the cable wire 40 (connected to the pin 34) is secured within the remote opening unit of known type.

The drain unit 13 intrudes on the side wall 21, on the interior thereof, a shaped additional portion 117 of the wall 21. This additional portion 117 protrudes slightly from the periphery of the interior of the plug unit 13 into the interior space. The portion 117 is shaped to have therein a hole of a complementary shape to the end of the pin 34. The section of the wall 21 below the additional portion 117 is thickened so that the internal dimensions of the lower portion of the sink unit 13, adjacent the bottom 22, is less than that adjacent the top 20. The thickened wall incorporates a vertical slot 27 which does not extend through the entire thickness of the wall 21, but which incorporates access to the hole complementary to the shape of the end of the pin 34.

The above described drain unit 2 works as follows: the plug unit 13 can be pushed down to the closed position by a thumb or other means. Once the plug unit 13 is at its lowest position and the top 20 of the plug 13 is flush with the top of the drain flange 16, the pin 34 is aligned with the slot 27 and hole complementary to the pin 34 in the portion 117. The operation of the fine spring 37 pushes the pin 34 through the slot 27 in to the complementary hole, holding the plug unit 13 in the closed position.

For the plug unit 13 to be moved from the closed position to the open position, the remote opening unit is operated in known manner to release the end pin 34 via the cabling 14. This operates to move the inner cable 40, and the pin 34 back away from the centre of the plug unit 13. The head of the pin 34 retreats to rest within the slot 27. The spring 28 operates to raise the plug unit 13 up in the direction of arrow A. The bottom of the slot 27 operates against the pin 34 to retain the plug unit 13 from being released totally from the drain 11.

The component parts of the drain 11 and plug unit 13 are preferably of metals such

as brass, brass alloys, stainless steel, or other metals or alloys appropriate for use in bathrooms/kitchens/waste fittings. Plastics materials may be used however, if so desired. The material or surface finish of the drain flange 16 and plug top 20 may be selected for visual appeal and a good finished appearance. If so desired, a shallow depression (eg, thumb sized) may be shaped into the top 20 of the plug 13. Preferably this is positioned on the top 20 immediately over the slot 27.

A second preferred embodiment is shown in Figs. 2 and 3. Like parts are numbered in like fashion. The major difference between the first and the second preferred embodiments is that in the second preferred embodiment the complementary hole in which the pin 34 sits when the drain unit 13 is closed forms part of a thickened wall 127 of the side wall 21 of the drain unit 13. The thickening 127 of the side wall 21 continues to the bottom 22 of the drain unit 13. Thus the interior of the drain unit, through which waste water flows, has a smooth change from one diameter to the second diameter (over the pin 34 and to the bottom 22 of the plug unit 13). However the manner of operation of the second preferred embodiment is identical with that of the first preferred embodiment of the present invention.

In respect of both embodiments it will be appreciated that the plug unit 13, along with the remote operation controls, can be fitted to an existing waste pipe unit 11 with only minor modifications to the waste pipe 11. Thus the plug 13 and remote operation controls may be sold separately.

In respect of both embodiments the spring 28 for retaining the plug 13 has been shown as shrouded. However it will be appreciated that the arrangement of the spring 28 may be as shown in PCT/NZ96/00031. Similarly, the pin spring 37 is shown as being adjacent the pin end of the cabling 41. However, it will be appreciated that this spring may operate at either end of the cabling 41.

CLAIMS:-

1. An improved remotely operated plug assembly for a sink or basin with a drain, said plug assembly including:

a sink waste unit secured within said drain, which includes a drain pipe;

a plug unit movably and releasably secured within said drain, said plug unit including a plug with a closed top and sides with holes formed therein, said plug unit being movably secured within the drain by an inter-engaging means which permits vertical movement of said plug unit within said drain, between an opened and a closed position and vice-versa, but which does not permit the removal of said plug from said drain under ordinary operating conditions, and which incorporates spring means to bias said plug to the open position, said open position being a position in which said holes are open to said sink or basin, and said closed position being a position in which said closed top is substantially flush with the top of said sink waste unit;

an opening mechanism situated remotely from said drain and plug unit and connected by cabling to a retaining mechanism, said opening mechanism including an opening means to move and retain one end of said cabling;

a retaining mechanism, to keep said plug unit in the closed position, includes spring-biased means to release said retaining mechanism to allow said plug to move to the open position;

means for enabling the plug to be physically removed from said drain and replaced therein; wherein

the plug is capable of movement between an open and a closed position by manual depression of said plug, and between a closed and an open position by operation of said remotely placed opening mechanism to release the retaining mechanism via the cabling; and wherein

said inter-engaging means and said retaining means have common elements which are circumferentially situated within said drain pipe or about said drain pipe.

2. An improved remotely operated plug assembly as claimed in claim 1 wherein said inter-engaging means and said retaining means include:

a locating hole through the side of said drain pipe;

a portion of the lower half of the plug side over which the wall thickness of the side is

greater than the remainder of the side of the plug, said portion containing a shaped longitudinal slot which does not extend through the thickness of the side, said plug being positioned such that the slot and the locating hole are capable of alignment;

a movable pin capable of location through said locating hole and slot and of being connected to one end of said cabling, the range of movement of the pin being less than the thickness of the thickened portion of the side of the plug; and

a pin hole located within the side wall of the plug and at the top end of said slot, said pin hole being of a shape complementary to the end of the movable pin and positioned to receive the head therein when the plug is in the closed position; and wherein

said pin retains said plug in the closed position by the operation of said spring-biassed means of the retaining mechanism to maintain said pin in said pin hole; and

said pin retains the plug within the pipe by interaction of the pin with the bottom of the slot after said spring biassed means is operated and the spring means acts to push the plug to the open position.

3. The plug assembly as claimed in either claim 1 or claim 2 wherein the side of the plug is dimpled about said pin hole, said dimple extending slightly beyond the side of the plug into the interior of the plug.

4. The plug assembly as claimed in either claim 1 or claim 2 wherein the transition in the wall thickness of the side of the plug from the top of said portion to the bottom of the plug is smooth and gradual and the lower portion of the side wall of the plug has a constant interior cross-section.

5. The plug assembly as claimed in any one of the preceding claims wherein the parts of the plug assembly are made from materials selected from the group consisting of: brass; brass alloys; stainless steel, other metal alloys appropriate for use in bathroom fittings; plastics materials; and a combination thereof.

6. A plug unit for a sink or basin with a drain, said plug unit being remotely operated and being movably and releasably secured within a drain pipe, said unit including:

a plug with a closed top and sides with holes formed therein, said plug unit being movably secured within the drain by an inter-engaging means which permits vertical movement of said plug unit within said drain, between an opened and a closed position and vice-versa, but which does not permit the removal of said plug from said drain under ordinary operating conditions, and which incorporates spring means to bias said plug to the open position, said open position being a position in which said holes are open to said sink or basin, and said closed position being a position in which said closed top is substantially flush with the top of said sink waste unit;

an opening mechanism situated remotely from said drain and plug unit and connected by cabling to a retaining mechanism, said opening mechanism including an opening means to move and retain one end of said cabling;

a retaining mechanism, to keep said plug unit in the closed position, includes spring-biased means to release said retaining mechanism to allow said plug to move to the open position;

means for enabling the plug to be physically removed from said drain and replaced therein; wherein

the plug is capable of movement between an open and a closed position by manual depression of said plug, and between a closed and an open position by operation of said remotely placed opening mechanism to release the retaining mechanism via the cabling; and wherein

said inter-engaging means and said retaining means have common elements which and are circumferentially situated within said drain pipe or about said drain pipe.

7. A plug unit as claimed in claim 6 wherein said inter-engaging means and said retaining means include:

a locating hole through the side of said drain pipe;

a portion of the lower half of the plug side over which the wall thickness of the side is greater than the remainder of the side of the plug, said portion containing a shaped longitudinal slot which does not extend through the thickness of the side, said plug being positioned such that the slot and the locating hole are capable of alignment;

a movable pin capable of location through said locating hole and slot and of being connected to one end of said cabling, the range of movement of the pin being less than the thickness of the thickened portion of the side of the plug; and

a pin hole located within the side wall of the plug and at the top end of said slot, said pin hole being of a shape complementary to the end of the movable pin and positioned to receive the head therein when the plug is in the closed position; and wherein

said pin retains said plug in the closed position by the operation of said spring-biassed means of the retaining mechanism to maintain said pin in said pin hole; and

said pin retains the plug within the pipe by interaction of the pin with the bottom of the slot after said spring biassed means is operated and the spring means acts to push the plug to the open position.

8. The plug unit as claimed in either claim 6 or claim 7 wherein the side of the plug is dimpled about said pin hole, said dimple extending slightly beyond the side of the plug into the interior of the plug.

9. The plug unit as claimed in either cliam 6 or claim 7 wherein the transition in the wall thickness of the side of the plug from the top of said portion to the bottom of the plug is smooth and gradual and the lower portion of the side wall of the plug has a constant interior cross-section.

10. The plug unit as claimed in any of the claims 6 to 9 wherein the parts of the plug assembly are made from materials selected from the group consisting of: brass; brass alloys; stainless steel, other metal alloys appropriate for use in bathroom fittings; plastics materials; and a combination thereof.

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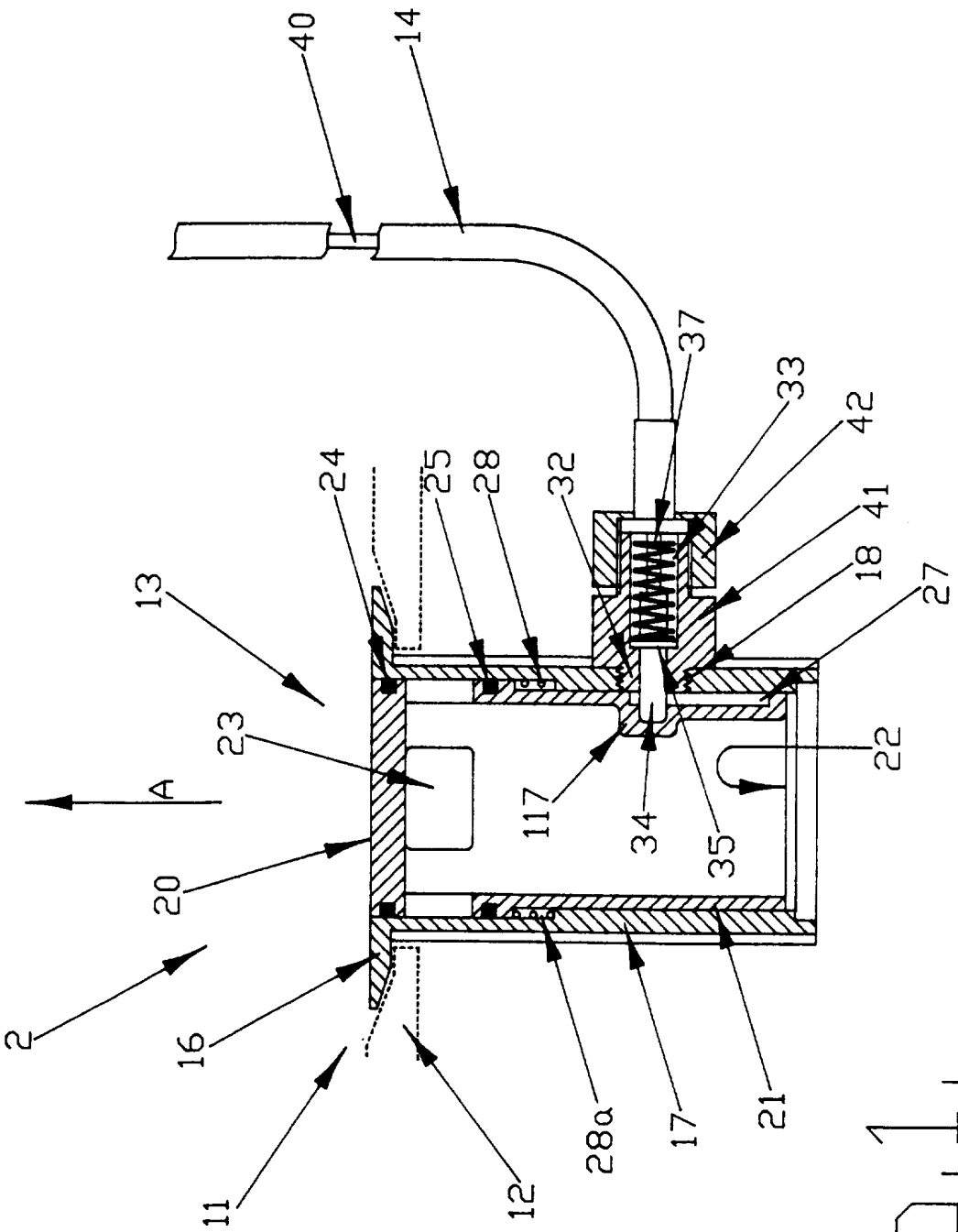
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Fig. 1

Fig. 2

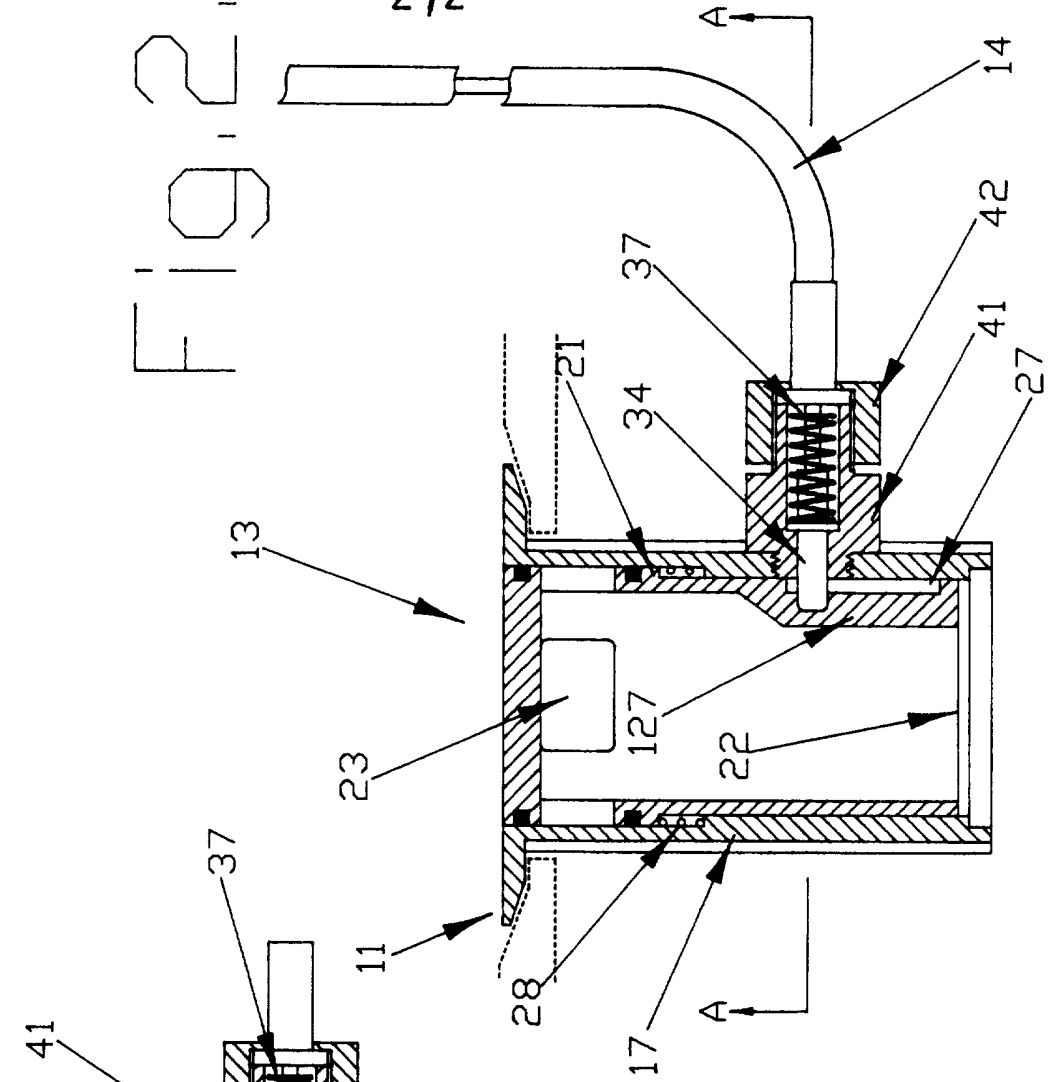
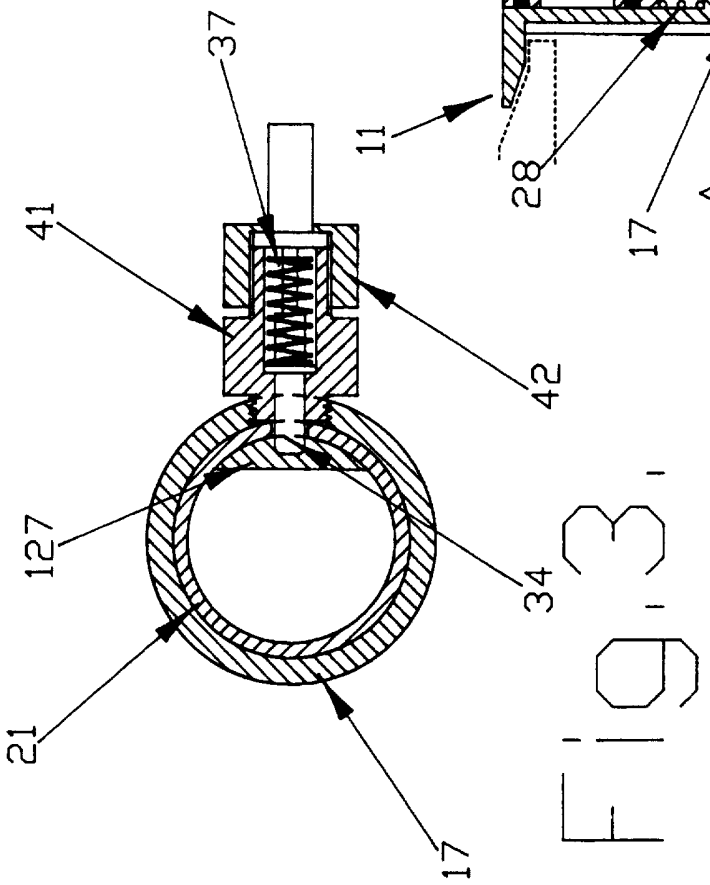


Fig. 3



INTERNATIONAL SEARCH REPORT

International Application No.
PCT/NZ 97/00080

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: A47K 001/14; E03C 001/22, 001/23

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC : A47K 001/14, E03C 001/22, 001/23

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC As above

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,Y	WO, 96/32044, A, (WES WASTES LTD), 17 October 1996 See entire document	1, 6
P,Y	WO, 97/16104, A, (WES WASTES LTD), 9 May 1997 See entire document	1, 6
Y	DE, 3108791, A, (GEBERIT AG), 24 December 1981 See figure 1, 2	1, 6

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP, 735206, A, (FISC ITALIANA S.r.l.), 2 October 1996	
A	GB, 431543, A, (CORNELL, E.S.), 10 July 1935	
A	CH, 251607, A, (CESAR MINGORI), 16 August 1948	
A	US, 1852123, A, (LUTSKY, B), 5 April 1932	
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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WO	97/16104	AU	73459/96		
DE	3108791	CH	645946		
EP	735206	NONE			
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