

(19)



(11)

EP 1 529 888 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
13.06.2012 Bulletin 2012/24

(51) Int Cl.:
E03C 1/10 (2006.01) **E03C 1/298** (2006.01)

(21) Application number: **04105563.3**

(22) Date of filing: **05.11.2004**

(54) **Device for preventing backflow of liquids**

Rückflussverhinderer von Flüssigkeiten

Dispositif pour éviter le reflux d'eau

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **06.11.2003 NL 1024720**

(43) Date of publication of application:
11.05.2005 Bulletin 2005/19

(73) Proprietor: **Intelligent Environmental Systems
B.V.
1822 BW Alkmaar (NL)**

(72) Inventor: **Van Baar, Jacobus, Eldert, Maria
1862 VD, Bergen (NL)**

(74) Representative: **Metman, Karel Johannes
De Vries & Metman
Overschiestraat 180
1062 XK Amsterdam (NL)**

(56) References cited:
**FR-A- 2 575 538 GB-A- 2 320 310
US-A- 2 328 382 US-A- 3 334 646
US-A- 4 870 992**

EP 1 529 888 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The invention relates to a device for preventing backflow of liquids, in particular for use in a conveying line for (waste) water and the like, for example in sewage systems according to the preamble of claim 1.

[0002] Such devices are known in various embodiments thereof, they may also be referred to as non-return valves. A device according to the preamble is disclosed in US 2,328,382. This document describes flexible check valves and vacuum breakers which are formed from flexible material such as rubber. Coacting lips at an edge of the second end an abutting flexible sleeve member are formed from one piece of material.

[0003] The object of the invention is to provide a novel device for preventing backflow of liquids.

[0004] In order to accomplish that object, the device according to the invention has the features of the characterizing portion of claim 1.

[0005] Advantageously, the edge on said second end is made up of at least two portions, which are interconnected in a pivot-like manner at their places of contact.

[0006] In this way there is created a closure which is similar to that of the opening of a "squeeze purse".

[0007] The advantage of the portion of relatively soft material is that it is possible to obtain an adequate seal in this portion, also if the edge does not shut off completely. This is the case in particular if a liquid pressure prevails in the downstream portion of the conveying line. Said pressure will act on the outer side of the portion made of the relatively soft material, as a result of which said portion is squeezed tightly shut, as it were, and an especially adequate self-sealing action is obtained.

[0008] It is advantageous in this respect if pressure-resistant elements are provided in the portion made of the relatively soft material, which elements offer resistance in particular against pressure in a direction at least substantially parallel to the central axis of the second end.

[0009] The presence of said pressure-resistant elements makes it possible to select the soft, deformable material by its sealing action rather than by its constructional strength. Said constructional strength is provided by the pressure-resistant elements.

[0010] The invention will be explained in more detail hereinafter with reference to the drawings, which very schematically illustrate an embodiment of the device according to the invention.

Fig. 1 is a perspective view of a device according to the invention, in which a housing that surrounds the device is schematically indicated.

Figs. 2, 3 and 4 are a side view, a front view and a top plan view, respectively, in which the subject matter of Fig. 1 is shown on a smaller scale.

Figs. 5 - 8 are views corresponding to Figs. 1 - 4, which show the device of Figs. 1 - 4 in the open position thereof.

Figs. 9 - 12 are views corresponding to Figs. 5 - 8,

which show the device in the closed position thereof.

[0011] Figs. 1 - 4 show a device for preventing backflow of liquids, in particular for use in a conveying line for (waste) water and the like, for example in a pressurised sewer system. The invention can also be used in other liquid conveying lines, of course, in which the liquid being conveyed may or may not contain solid impurities.

[0012] The device comprises a liquid-tight housing 1 (illustrated in dashed lines), in which a flow member 2 is accommodated. The housing comprises a first connection 3 and a second connection 4 at opposite ends for being connected to pipes or other types of channels of a liquid conveying system or the like.

[0013] The flow member 2 has a first end 5 and a second end 6. The first end 5 is formed on the upstream end of a pipe-shaped portion 7 of the flow member 2. Said first end 5 is open at all times, and the pipe-shaped portion 7 is made of a substantially non-deformable material.

[0014] The second end 6 is configured to be deformable between a substantially flat, tightly shut closed position, and a widened, open position. In this embodiment, the second end 6 is configured similarly to the opening of a "squeeze purse". For that purpose, the second end 6 is provided with an edge 8 of a relatively hard material, which is biased to the closed position. Said material may be a harder rubber, for example, or an elastically deformable metal, such as steel or the like, which may be coated with a rubber.

[0015] In either case, the material is biased to the closed position, or, in other words, the material is relaxed in said closed position, and a force must be exerted when deforming the edge 8 from the closed position. In this way a memory effect is obtained, such that said second end 6 will not open until an internal pressure is exerted from the first connection 3. When said pressure is released or reversed, the first end 5 will move towards the closed position.

[0016] In this case the edge 8 consists of two edge portions 9 and 10, which are interconnected by pivot means 11 at both ends. Thus, the edge portions 9 and 10 extend in a substantially straight line between the pivot means 11 in the closed position (see Figs. 3 and 11), whilst the edge portions 9 and 8 have each been deformed into a semi-circular shape, a semi-oval shape (see Fig. 7) or other curved shape in the open position.

[0017] At a position adjoining the edge 8, the flow member 2 comprises a portion 12 of a relatively soft, deformable material, such as a soft rubber. Said portion 12 joins the pipe-shaped portion 7 and is provided with pressure-resistant elements 13, two in this case, which are aligned with the pivot means 11 in this embodiment. The pressure-resistant elements 13 ensure that said portion will resist deformation in a direction parallel to the central axis of the second end 6, i.e. parallel to the direction of flow of the flow member 2 in this embodiment. The portion 12 is therefore capable of deformation in a direction at least substantially perpendicularly to the direction of flow,

but not in a direction parallel thereto. The soft material of said portion 12 can therefore be selected by its ability to provide an adequate seal in the closed position of the flow member 2. Said pressure-resistant elements may also be provided at other positions, of course, or other types of elements may be used, as long as the sealing action is not adversely affected thereby. In this embodiment, the portion 12 is relatively long so as to ensure that the flow member 12 is shut off in an adequate manner.

[0018] Figs. 5 - 8 show the situation in which the pressure at the first connection 3 is higher than at the second connection 4 of the housing 1, as a result of which liquid tends to flow from the first connection to the second. The fluid pressure causes the edge portions 9 and 10 of the edge to be deformed to a curved position, as a result of which a passage is formed at the second end 6 of the flow member 2 (see the arrows).

[0019] Figs. 9 - 12 show the situation in which the pressure at the second connection 4 is higher than at the first connection 3. Said pressure causes the edge portions 9 and 10 to return to the biased position again, whilst the soft material of the portion 12 is pressed together inwardly to a closed position (see the arrows) by the external, higher fluid pressure, as a result of which a very good seal is obtained, also in the situation in which an incomplete seal is obtained at the edge 8, for example as a result of a hard particle still being present in the liquid at that location.

[0020] From the foregoing it will be apparent that the invention provides a device for preventing backflow of liquid that is remarkable for its reliable operation and for providing an adequate seal in the closed position.

[0021] The invention is not limited to the embodiment as described above and illustrated in the drawing, which can be varied in many ways within the scope of the appended claims.

Claims

1. A device for preventing backflow of liquids, in particular for use in a conveying line for (waste) water and the like, comprising a flow member (2) having a first end (5) and a second end (6), which first end is preferably open and which second end can be opened and closed, for which purpose the second end (6) is made of a deformable material, such that said second end is deformable between a substantially flat, closed position, and a squeezed-together, open position, said second end (6) being biased to the closed position, **characterized in that** the second end (6) is formed with an edge (8) which comprises a relatively hard material, which is biased to the closed position, and a portion (12) abutting the edge (8) and being made of relatively soft, deformable material such that the portion (12) can be squeezed.
2. A device according to claim 1, wherein the edge (8)

on said second end (6) is made up of at least two portions (9, 10), which are interconnected in a pivot-like manner at their places of contact (11).

3. A device according to claim 1 or 2, wherein pressure-resistant elements (13) are provided in the portion (12) made of the relatively soft material, which elements offer resistance in particular against pressure in a direction at least substantially parallel to the central axis of the second end (6).
4. A device according to claim 3, wherein said pressure-resistant elements (13) are provided at least in line with said pivot-like places of contact (11).
5. A device according to any one of the claims 1 - 4, wherein a substantially non-deformable pipe-shaped portion (7) provided with said first end (5) abuts the portion (12) made of the relatively soft material.
6. A device according to any one of the preceding claims, wherein the flow member (2) is accommodated in a liquid-tight housing (1) which surrounds the flow member and which comprises connections at both ends (3, 4) for being connected to further liquid conveying lines.
7. A device according to any one of the claims 1 - 6, wherein the edge on the second end (6) is formed of a hard, rubbery material, or of an elastically deformable metal that is preferably coated with a rubbery material.
8. A pipe for conveying liquid, in particular waste water, provided with a device according to any one of the preceding claims.

Patentansprüche

1. Vorrichtung zum Verhindern des Rückflusses von Flüssigkeiten, insbesondere zur Verwendung in einer Förderleitung für (Ab)wasser und ähnliche Flüssigkeiten, mit einem Strömungselement (2) mit einem ersten Ende (5) und einem zweiten Ende (6), wobei das erste Ende vorzugsweise offen ist und das zweite Ende geöffnet und geschlossen werden kann, wobei das zweite Ende zu diesem Zweck aus einem verformbaren Material hergestellt ist, so dass das zweite Ende verformbar ist zwischen einer im Wesentlichen flachen geschlossenen Position und einer zusammengedrückten offenen Position, wobei das zweite Ende (6) zur geschlossenen Position hin vorgespannt ist;
dadurch gekennzeichnet, dass
am zweiten Ende (6) ein Randabschnitt (8) ausgebildet ist, der ein relativ hartes Material aufweist, das

zur geschlossenen Position hin vorgespannt ist; und an den Randabschnitt (8) ein Abschnitt (12) anschließt, der aus einem relativ weichen verformbaren Material hergestellt ist, so dass der Abschnitt (12) zusammengedrückt werden kann.

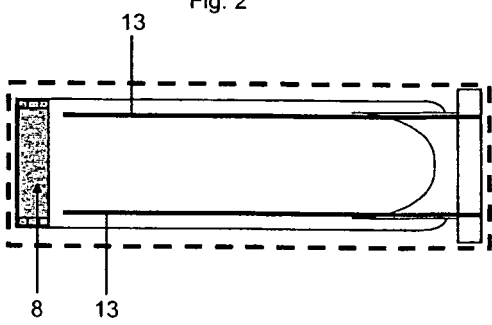
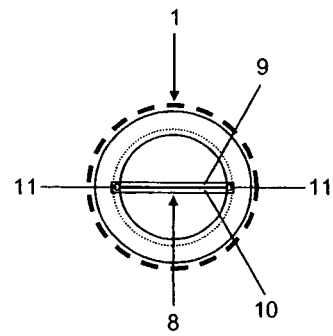
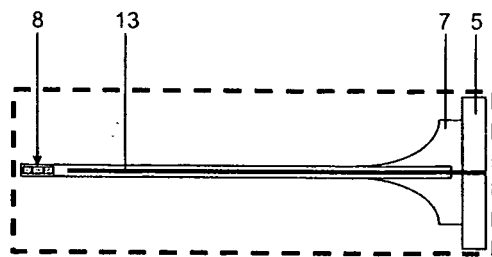
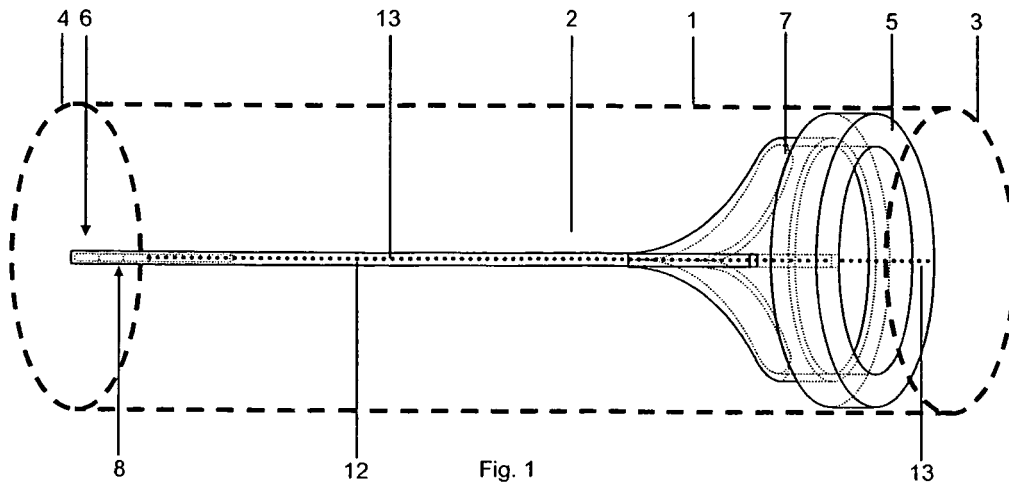
2. Vorrichtung nach Anspruch 1, wobei der Randabschnitt (8) am zweiten Ende (6) aus mindestens zwei Abschnitten (9, 10) gebildet wird, die an ihren Kontaktstellen (11) auf eine gelenkähnliche Weise miteinander verbunden sind.
3. Vorrichtung nach Anspruch 1 oder 2, wobei druckbeständige Elemente (13) in dem aus einem relativ weichen Material hergestellten Abschnitt (12) bereitgestellt werden, wobei die Elemente insbesondere einem Druck Widerstand entgegensetzen, der mindestens im Wesentlichen parallel zur Mittelachse des zweiten Endes (6) ausgeübt wird.
4. Vorrichtung nach Anspruch 3, wobei die druckbeständigen Elemente (13) mindestens in einer Linie mit den drehgelenkähnlichen Kontaktstellen (11) ausgerichtet sind.
5. Vorrichtung nach einem der Ansprüche 1 bis 4, wobei ein im Wesentlichen nicht verformbarer rohrförmiger Abschnitt (7), in dem das mindestens eine Ende (5) angeordnet ist, an den aus dem relativ weichen Material hergestellten Abschnitt (12) anschließt.
6. Vorrichtung nach einem der vorangehenden Ansprüche, wobei das Strömungselement (2) in einem flüssigkeitsdichten Gehäuse (1) aufgenommen ist, das das Strömungselement umschließt und Verbindungen an beiden Enden (3, 4) aufweist, die dazu vorgesehen sind, mit weiteren Flüssigkeitsförderleitungen verbunden zu werden.
7. Vorrichtung nach einem der Ansprüche 1 bis 6, wobei der Randabschnitt des zweiten Endes (6) aus einem harten, gummiartigen Material oder aus einem vorzugsweise mit einem gummiartigen Material beschichteten, elastisch verformbaren Metall hergestellt ist.
8. Rohr zum Fördern einer Flüssigkeit, insbesondere von Abwasser, das mit einer Vorrichtung nach einem der vorangehenden Ansprüche versehen ist.

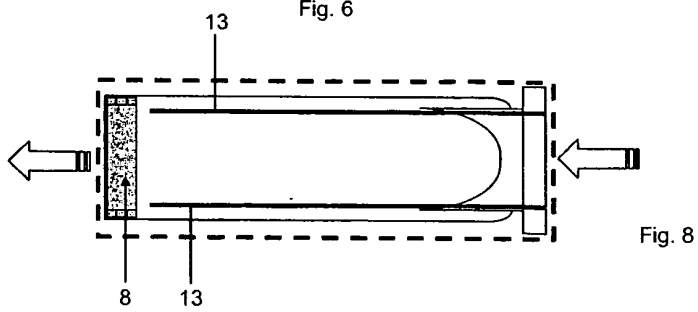
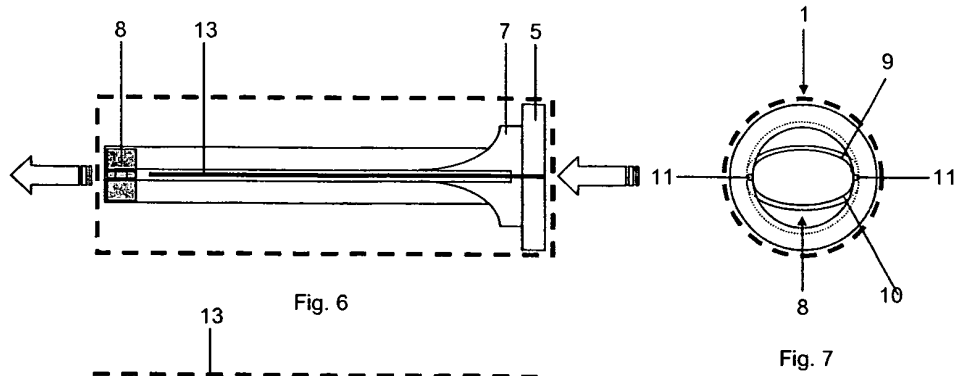
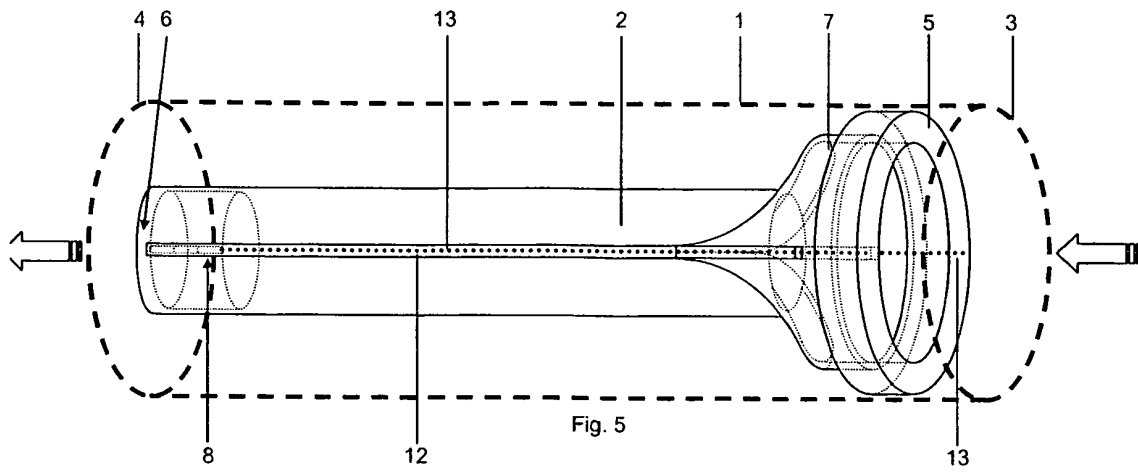
Revendications

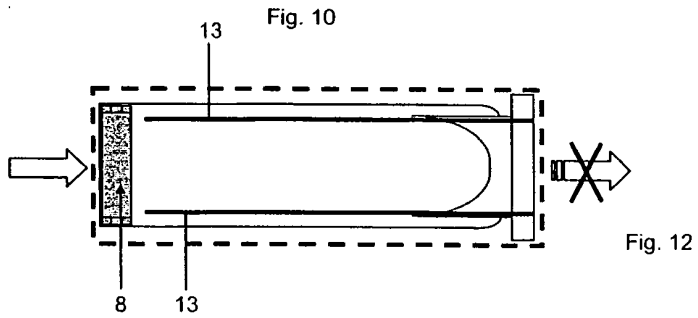
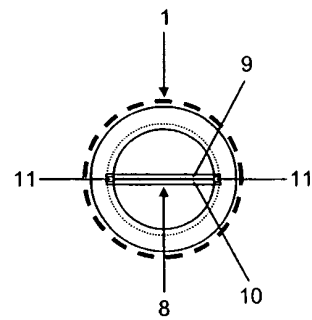
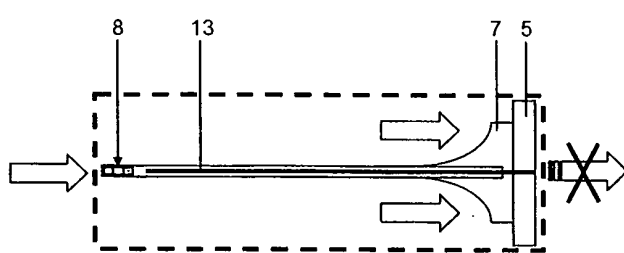
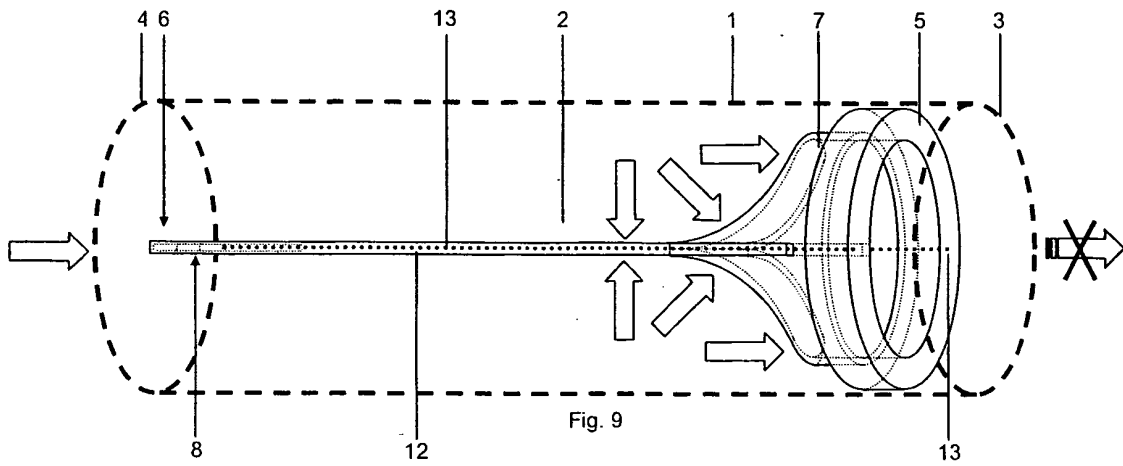
1. Dispositif pour empêcher le refoulement de liquides, en particulier destiné à être utilisé dans une conduite de transport pour des eaux (usées) et analogues, comprenant un élément d'écoulement (2) possédant

une première extrémité (5) et une seconde extrémité (6), laquelle première extrémité est de préférence ouverte et laquelle seconde extrémité peut être ouverte et fermée, et, dans ce but, la seconde extrémité (6) est faite d'un matériau déformable, de sorte que ladite seconde extrémité soit déformable entre une position fermée sensiblement plate, et une position ouverte comprimée, ladite seconde extrémité (6) étant sollicitée dans la position fermée, **caractérisé en ce que** la seconde extrémité (6) est formée avec un bord (8) qui comprend un matériau relativement dur, qui est sollicité dans la position fermée, et une partie (12) en butée contre le bord (8) et faite d'un matériau déformable relativement mou de sorte que la partie (12) puisse être comprimée.

2. Dispositif selon la revendication 1, dans lequel le bord (8) sur ladite seconde extrémité (6) comprend au moins deux parties (9, 10), qui sont reliées mutuellement à la manière d'un pivot à leurs emplacements de contact (11).
3. Dispositif selon la revendication 1 ou 2, dans lequel des éléments résistants à la pression (13) sont prévus dans la partie (12) faite du matériau relativement mou, lesquels éléments offrent une résistance en particulier contre une pression dans une direction au moins sensiblement parallèle à l'axe central de la seconde extrémité (6).
4. Dispositif selon la revendication 3, dans lequel lesdits éléments résistants à la pression (13) sont prévus au moins de façon alignée avec lesdits emplacements de contact de type pivot (11).
5. Dispositif selon l'une quelconque des revendications 1 à 4, dans lequel une partie en forme de tuyau sensiblement non déformable (7) pourvue de ladite première extrémité (5) est en butée contre la partie (12) faite du matériau relativement mou.
6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément d'écoulement (2) est agencé dans un logement étanche aux liquides (1) qui entoure l'élément d'écoulement et qui comprend des raccords à ses deux extrémités (3, 4) pour être raccordé à des conduites de transport de liquide supplémentaires.
7. Dispositif selon l'une quelconque des revendications 1 à 6, dans lequel le bord sur la seconde extrémité (6) est formé d'un matériau caoutchouteux dur ou d'un métal élastiquement déformable qui est de préférence revêtu d'un matériau caoutchouteux.
8. Tuyau pour transporter un liquide, en particulier des eaux usées, pourvu d'un dispositif selon l'une quelconque des revendications précédentes.







REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 2328382 A [0002]