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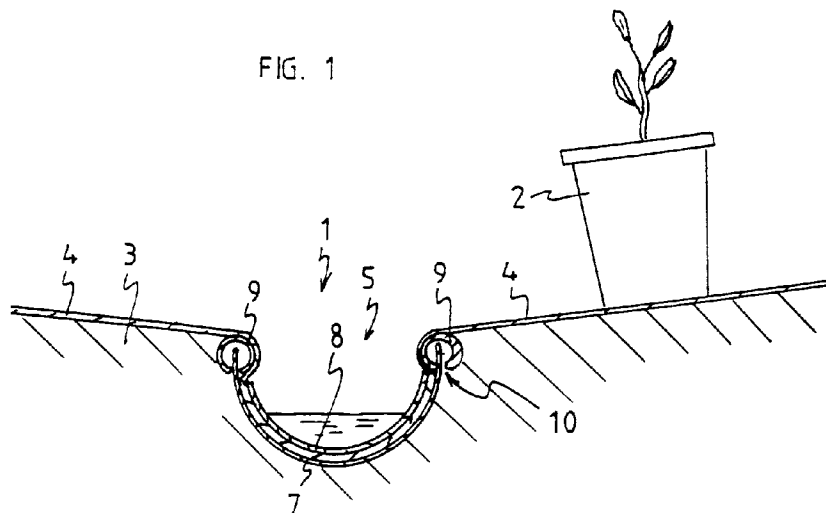
(54) Gutter system

(57) System (1) and method for collecting in a gutter (5) the surplus water from a certain surface (3), which area is covered by a water-impermeable sheet (4). Gutters (5) are used wherein each gutter part (7,8) comprise a pipe part which has a C-shaped cross-section, the high, bottom gutter parts (7) being of a height which is greater than the radius of the low, top gutter parts (8) while a water-impermeable sheet (4) is located between the bottom and top gutter parts (7,8). Preferably the edge of the bottom gutter parts (7) is provided with a covering rim (9).

Method of providing a certain surface (3) of a piece

of land or area with a system (1) with which it is possible to collect all the surplus water which is supplied over that certain surface (3). Firstly that certain surface (3) is levelled with a certain slope. Then it is provided with trenches. Then high, C-shaped bottom gutter parts (7) are placed in the trenches. Then the ground and the gutter parts (7) are covered with a water-impermeable film (4), and then second, low top gutter parts (8) are placed in the bottom, high gutter parts (7) which have been covered by the film (4), which top gutter parts (8) also comprise C-shaped pipe parts. Preferably, pipe parts are used which are made by cutting a cylindrical pipe in the lengthwise direction just above a plane of symmetry.

FIG. 1



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Description

The invention relates to a system for collecting, in a gutter, the surplus water from the amount of water which is supplied to a certain surface or area, which area is covered by a water-impermeable sheet, on which rows of pot plants, for example, may be or are arranged.

The invention also relates to a method for producing a system for draining a certain surface or area, the area being covered with a watertight sheet, on which plants which are to be irrigated with a liquid, for example rows of pot plants, are or may be arranged, the liquid being collected again in a gutter following irrigation.

In horticulture, nurseries, agriculture, etc., plants are grown with the aid of nutrients which, with the aid of water, the plants are able to take up from the soil. All kinds of substances, such as nutrients and, more particularly, growth-promoting substances, pesticides, herbicides, etc., are often fed to these plants, which are mostly grown in monocultures, in the water and in the soil. These substances, specifically nutrients, pesticides, herbicides, growth-promoting substances, etc., which have been fed to the plants are in part taken up by the plants. All the substances which are not taken up find their way into the soil. However, awareness is growing that these substances harm the environment, i.e. these substances exhibit all kinds of undesirable effects as a result of finding their way into the soil. For example, other plants will take up these substances, which substances will then have undesirable effects on their growth, such as severely restricting their growth, or, by contrast, will activate their growth. In order to counteract the influx of undesirable substances, more and more attempts are being made to develop systems which can prevent these substances from finding their way into the soil.

European Patent Application EP-0,072,559 discloses a system in which a piece of land is covered with a sheet of plastic, for example, the sheet being formed in the region of its edge such that the latter serves as a gutter. The surplus water which is supplied to the area which is covered by the sheet is then drained towards the gutter and collected therein. The object of the system described in this European Patent Application is to keep an area as moist as possible, by continuously wetting the area, but using as little water as possible. This is accomplished by collecting the water which sinks down into the soil and then returning the collected water to the area above the sheet. The object of this system is thus to keep the area continuously moist using as little water as possible. However, since the gutter is formed by the film itself, this system is very difficult to use in horticulture or agriculture, as it is not possible to form a gutter over several hundreds of metres such that the gutter drains the water efficiently at the end of the gutter, i.e. over many hundreds of metres. It is not possible to form a gutter from a sheet of plastic with the gutter running towards a certain point with a small drop over many

hundreds of metres. In this known system, it is also not important that all the liquid be collected, but simply that as much liquid as possible be collected, in order to be able to operate economically.

PCT/NL92/00046, Patent Application WO 93/18239, discloses a system in which preformed gutter parts are positioned near the edge of the area which is covered with film, and the edge of the adjoining film is fastened to the edge of the gutter parts using auxiliary means, such as clamping means or adhesives. In this case, the gutter is formed such that the gutter has a circular or rectangular cross-section, with the upwardly directed side being provided with openings.

The drawback of this known system is that the edge of the film has to be stuck to the gutter well, since if the edge of the film is fastened to the edge of the gutter only with clamping means, then the water can still flow away into the soil under the watertight sheet. Fastening the edge of the film using adhesives is also very time-consuming and is not easy if the gutter parts have already been placed in the ground. Another drawback is that the gutter, which comprises a cut-open piece of pipe, is weak and easily deformable. In order to provide the gutter with sufficient strength to be able to exert counter-pressure against the pressure of the surrounding earth, the gutter is provided with bridge pieces, which keep the ends of the C-shaped cross-section of the gutter parts apart at a few places. The watertight connection of the film to the gutter at the position of these bridges is very poor. In this known system, the gutter parts are connected together by means of sleeves.

The object of the invention is a system which can be assembled rapidly and easily and with which all the surplus water which is supplied to an area is collected and returned to a collection area. This makes it possible, for example, to reuse all the recovered water with the substances dissolved therein, or, if desired, all the undesirable substances can be separated from the water or degraded to form substances which are not harmful to the environment, and which system thus does not exhibit the drawbacks of the known systems. Another object of the invention is a method of providing a certain surface of a piece of land or area with a system with which it is possible to collect all the surplus water which is supplied over that certain surface.

This object of the invention is achieved using a system in accordance with that described in the preamble in that the gutter comprises a plurality of upper gutter parts and a plurality of lower gutter parts, each gutter part comprising a pipe part of a certain diameter, which has a C-shaped cross-section and is provided with a longitudinal opening over its length, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, the high, bottom gutter parts being of a height which is greater than the radius of the pipe part, and the low, top gutter parts being of a height which is smaller than the radius of the pipe part, and in that the water-impermeable sheet

is located between the bottom and top gutter parts. This system according to the invention makes it possible, in a simple manner, to cover a piece of land completely watertightly with a sheet of waterproof film and gutters, which system can also easily be moved again to another location, if desired. These measures mean that a gutter can very easily be formed at any desired location in the watertight sheet without the sheet having to be interrupted at that location. Also, the gutter parts do not have to be fastened anywhere to one another or to the film using adhesives or extra measures. It can also be impossible for a leak to occur anywhere, since the sheet runs right through the gutter. In this way, the sheet is connected to the gutter in a leaktight manner over the entire length of the gutter. Due to the fact that the gutter comprises a double pipe part, the wall of the gutter is stiff, and there will be scarcely any distortion of the gutter. It is also able to offer sufficient resistance to the earth pressure, which prevents the gutter being deformed by the earth pressure, so that in principle no extra auxiliary pieces, such as bridge pieces, are required. By displacing the top and bottom gutter parts with respect to one another, so that the joints of the top gutter parts do not coincide with the joints of the bottom gutter parts, the gutter parts do not even have to be welded to one another or fastened to one another in some other manner. The entire system is thus easy to take apart after use and can easily be moved to another piece of land, which can then be covered thereby; it is thus quite feasible to use the system anywhere temporarily; it is also easy to carry out certain repairs. In this way, all components of the system are reusable.

In a preferred embodiment, the two gutter parts are made of a cylindrical piece of pipe which is cut through lengthwise at two locations. As a result, existing pipes can be used, and a gutter of this kind can be produced extremely economically. Moreover, the two gutter parts will have exactly the same radius, as a result of which the inner gutter part will fit correctly into the bottom gutter part, so that the watertight sheet lies securely clamped between the two gutter parts.

In order to protect the watertight sheet against the sharp edge of the outer gutter part, the edge of that gutter part is preferably provided with a covering rim. This covering rim preferably comprises a tubular part of small diameter which is cut through once lengthwise. A covering rim of this kind is simple and inexpensive to produce, for example by the covering rim comprising a tubular part of small diameter which is cut through once lengthwise, while the edge over which the sheet is guided is rounded. Moreover, the tubular covering rim will ensure that the top gutter parts which are placed in the bottom gutter parts will be accommodated in the bottom gutter parts in a securely clamped manner. Furthermore, the covering rims also serve to connect two successive bottom gutter parts to one another; the two successive gutter parts, at the two sides where the gutter parts adjoin one another, may be fastened to one an-

other by means of the covering rims.

Preferably, the difference in height between one pipe part and the other pipe part approximately corresponds to the diameter of the tubular covering rim, so that the various components fit well and the bottom and top gutter parts fit exactly in one another.

In a further preferred embodiment, the larger and the smaller gutter parts are both constructed from parts of essentially C-shaped cross-section which are aligned with one another, the ends of the parts of the larger gutter part and the ends of the parts which form the smaller gutter part not lying above one another. As a result, it is not necessary to use sleeves for fastening the various aligned parts to one another. An opening may also be left between the gutter parts, which makes it possible for the gutter to expand freely in the event of major temperature changes.

The object of the invention is also achieved using a method in that firstly that certain surface is levelled and, if desired, levelled with a slight slope, so that it is easy for water to flow away in a certain desired direction, in that the certain surface is then provided with trenches, with the desired drop, at the location where a gutter for drainage is to be arranged, then identical, high, bottom gutter parts are placed adjacent to one another in the trenches, which bottom gutter parts comprise a C-shaped pipe part which is provided over its length with a longitudinal opening, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, and each bottom gutter part being of a height which is greater than the radius of the pipe part, and in that the bottom gutter parts and the region surrounding the gutter of bottom gutter parts formed in this way are subsequently covered with a water-impermeable film, and then second, low top gutter parts are placed in the bottom, high gutter parts which have been covered by the film, which top gutter parts comprise a C-shaped pipe part which has approximately the same diameter as the bottom C-shaped gutter parts, and which top gutter parts are provided over their length with a longitudinal opening, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, and each low, bottom gutter part being of a height which is smaller than the radius of the pipe part. As a result, this method makes it possible in a rapid and simple manner to obtain a stiff drainage gutter which is not readily deformable using easily obtainable starting materials, with a robust connection of the watertight sheet to the gutter.

The invention will be explained in more detail with reference to the drawings, in which:

Figure 1 shows a front view of a system according to the invention;

Figure 2 shows a detail of another possible embodiment of a system according to the invention;

Figures 3a, b, c, d show various steps in the manufacture of a system according to the invention;

Figure 4 shows a perspective view of a system according to the invention;

Figure 5 shows a view of a connection between two bottom gutter parts, with clamping rim, and top gutter parts.

Figure 1 shows a system 1 for collecting water or draining water for the irrigation of plants 2 which are placed in containers or pots. The pots containing the plants 2 are placed on two slightly sloping surfaces 3 which are covered by a watertight film or sheet 4. Both surfaces 3 slope down in the direction of a gutter 5, in which the liquid 6 is collected and drained away. The gutter 5 is constructed from two C-shaped gutter parts, specifically an outer, bottom gutter part 7 and an inner or top gutter part 8, which are both positioned with the open side directed upwards. The outer gutter part 7 is higher than the radius of the circular cross-section, while the inner gutter part 8 is slightly smaller than the radius of the cross-section. The sheet 4 runs through from one surface 3, between the inner gutter part 8 and the outer gutter part 7, to the other surface 3, the sheet being clamped firmly between the inner gutter part 8 and the outer gutter part 7. The edges of the gutter 5 are covered by a covering rim 9, which in this example comprises a piece of pipe which is provided with a slot 10 which runs in the longitudinal direction of the piece of pipe 9. The sheet 4 is guided over the covering rims 9.

Figure 2 shows another possible embodiment of the system according to the invention, the edge 11 of the sheet 4 being clamped between the two gutter parts 7, 8. In this case, the film does not run continuously from one side of the gutter to the other side, but stops at a distance from the covering rim 9. A connection of this kind can also be made watertight without having to make use of adhesives. It merely has to be borne in mind that not all the connections of the various gutter parts and covering rims should be made at the same location.

Figure 3a, b, c and d successively show the various steps for constructing a system according to the invention. Firstly, a piece of pipe 12 is provided. As is depicted in Figure 3b, the piece of pipe 12 is cut through in the longitudinal direction at two locations 13, the locations 13 and the longitudinal axis of the piece of pipe not lying in one plane. This results in the formation of a smaller C-shaped pipe part 15, which will form the smaller, top gutter part 8, and a larger C-shaped pipe part 16, which will form the larger, bottom gutter part 7. The larger pipe part 16 is positioned at the desired location in the irrigation area, the pipe part being positioned with a desired drop in the longitudinal direction in a trench, in order in this way to drain the collected liquid. The surface on one side or on both sides of the gutter preferably slopes down in the direction of the gutter. These surfaces are

covered by a watertight sheet 4. As is depicted in Figure 3c, a sheet of watertight film 17 is then placed in the larger gutter part 7, usually after the two upright edges of the bottom gutter part 7 have been provided with a covering rim. The smaller gutter part 8 is then placed in the larger gutter part 7 on top of the sheet 17. Since the gutter parts 7 and 8 have been made from the same piece of pipe 12, they have the same radius, as a result of which the smaller gutter part 8 will be clamped firmly in the larger gutter part 7. Then, even after the two gutter parts have been placed in one another, the covering rims 9 may be arranged over the edges of the larger, bottom gutter parts 7. The outwardly protruding parts of the sheet 17 are then guided over the covering rims 9 and joined to the sheet 4 using, for example, a welded joint or an adhesive bond, so that the entire surface 3 is covered in a watertight fashion.

Figure 4 and Figure 5 show perspective views of possible connections for the gutter parts. In Figure 4, two bottom gutter parts 7 are placed aligned against one another and are covered by a covering rim, which is continuous at the location where the two gutter parts adjoin one another. Figure 5 shows, partially in cross-section, a bottom pipe 7 and a top pipe 8, with the sheet 4 clamped between them. The edge of the bottom gutter part 7 is covered by a pipe which has been cut through lengthwise. The sheet 4 is shown in part.

30 Claims

1. System for collecting, in a gutter, the surplus water from the amount of water which is supplied to a certain surface or area, which area is covered by a water-impermeable sheet, on which rows of pot plants, for example, may be or are arranged, characterized in that the gutter comprises a plurality of upper gutter parts and a plurality of lower gutter parts, each gutter part comprising a pipe part of a certain diameter, which has a C-shaped cross-section and is provided with a longitudinal opening over its length, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, the high, bottom gutter parts being of a height which is greater than the radius of the pipe part, and the low, top gutter parts being of a height which is smaller than the radius of the pipe part, and in that the water-impermeable sheet is located between the bottom and top gutter parts.
2. System according to Claim 1, characterized in that the two gutter parts comprise the two complementary parts of a cylindrical piece of pipe, which piece of pipe is cut through lengthwise at two locations parallel to the longitudinal axis.
3. System according to one of Claims 1 and 2, characterized in that the edge of the bottom gutter parts

is provided with a covering rim.

4. System according to Claim 3, characterized in that the covering rim comprises a tubular part of small diameter which is cut through once lengthwise. 5
5. System according to Claim 4, characterized in that the difference in height between one pipe part and the other pipe part approximately corresponds to the diameter of the tubular covering rim. 10
6. System according to one of the preceding claims, characterized in that each gutter is made up of bottom and top gutter parts, respectively, which are aligned with one another and are of essentially C-shaped cross-section, such that two ends of top gutter parts never adjoin one another at the location where two parts of top gutter parts adjoin one another, and vice versa. 15
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7. Method of providing a certain surface of a piece of land or area with a system with which it is possible to collect all the surplus water which is supplied over that certain surface, characterized in that firstly that certain surface is levelled and, if desired, levelled with a slight slope, so that it is easy for water to flow away in a certain desired direction, in that the certain surface is then provided with trenches, with the desired drop, at the location where a gutter for drainage is to be arranged, then identical, high, bottom gutter parts are placed adjacent to one another in the trenches, which bottom gutter parts comprise a C-shaped pipe part which is provided over its length with a longitudinal opening, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, and each bottom gutter part being of a height which is greater than the radius of the pipe part, and in that the bottom gutter parts and the region surrounding the gutter of bottom gutter parts formed in this way are subsequently covered with a water-impermeable film, and then second, low top gutter parts are placed in the bottom, high gutter parts which have been covered by the film, which top gutter parts comprise a C-shaped pipe part which has approximately the same diameter as the bottom C-shaped gutter parts, and which top gutter parts are provided over their length with a longitudinal opening, which longitudinal opening is delimited on both sides by an edge running parallel to the longitudinal axis of the pipe part, and each low, bottom gutter part being of a height which is smaller than the radius of the pipe part. 25
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8. Method for producing gutter parts for use in one of the systems according to one of the preceding claims or in the preceding method, characterized in that a pipe part made, for example, of plastic is, for 55

example, cut or sawn through lengthwise at two locations parallel to the longitudinal axis, such that one part is of a greater height which is greater than the radius of the pipe and thus forms a bottom gutter part, and the other, complementary part forms the other gutter part, or top gutter part.

FIG. 1

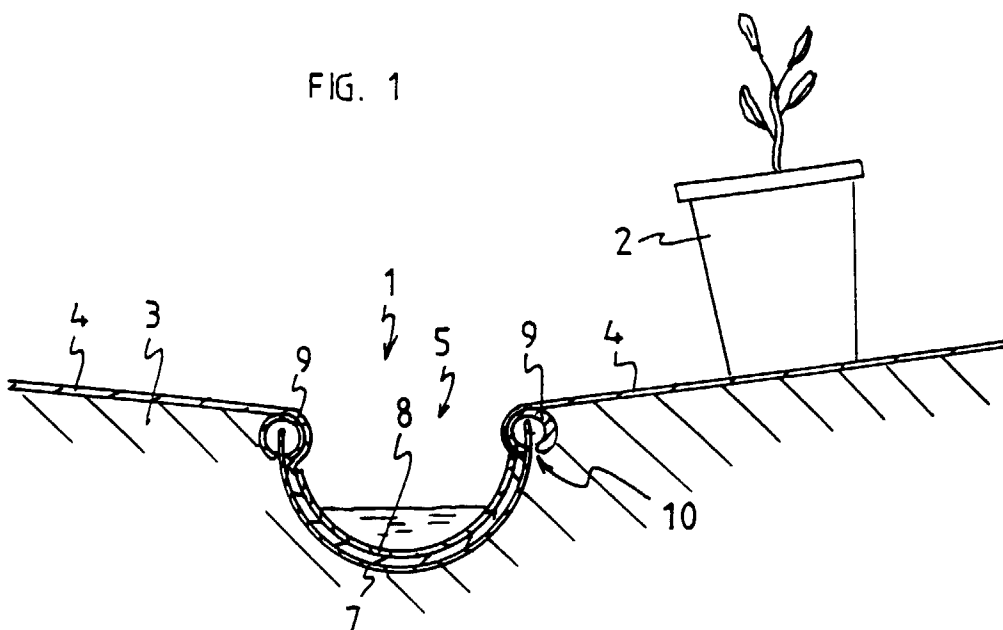


FIG. 2

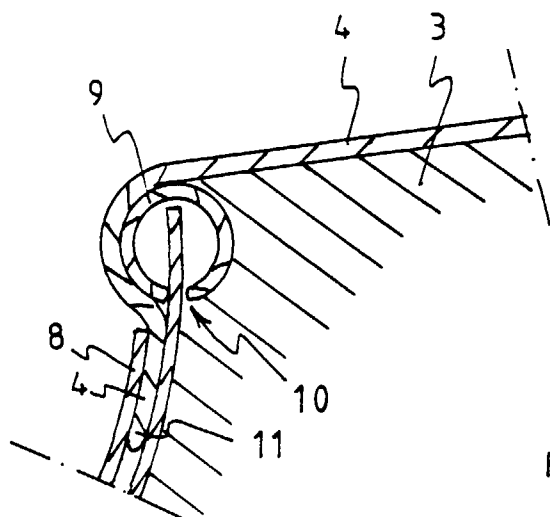


FIG. 3B

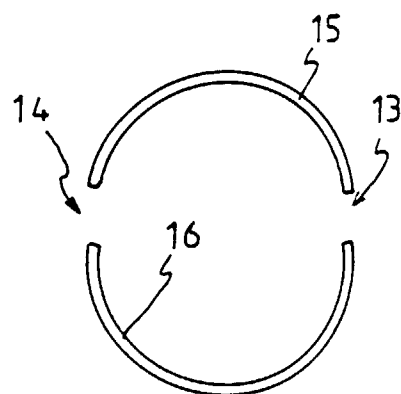
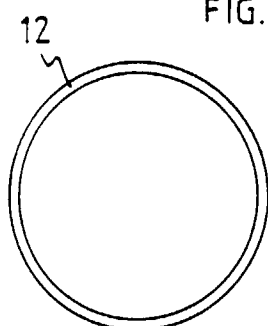


FIG. 3A



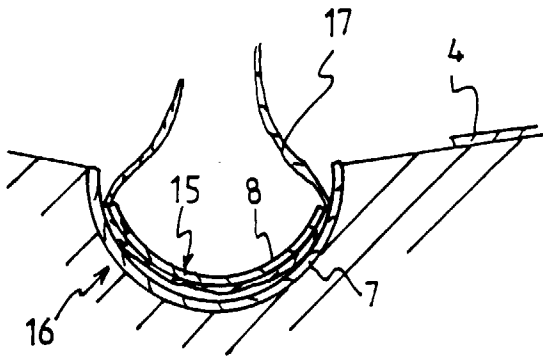


FIG. 3C

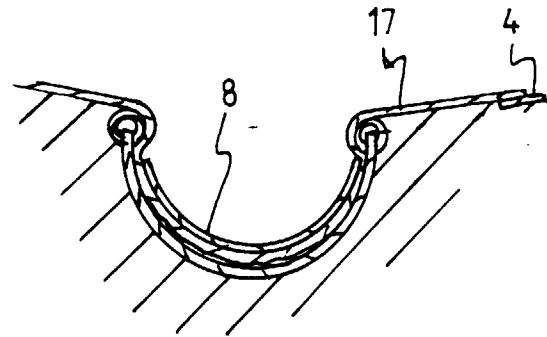


FIG. 3D

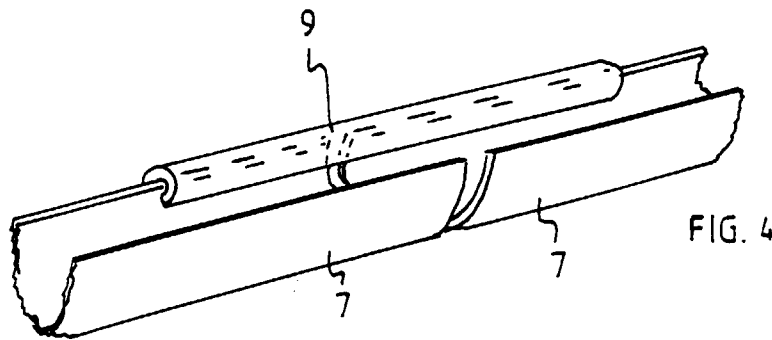


FIG. 4

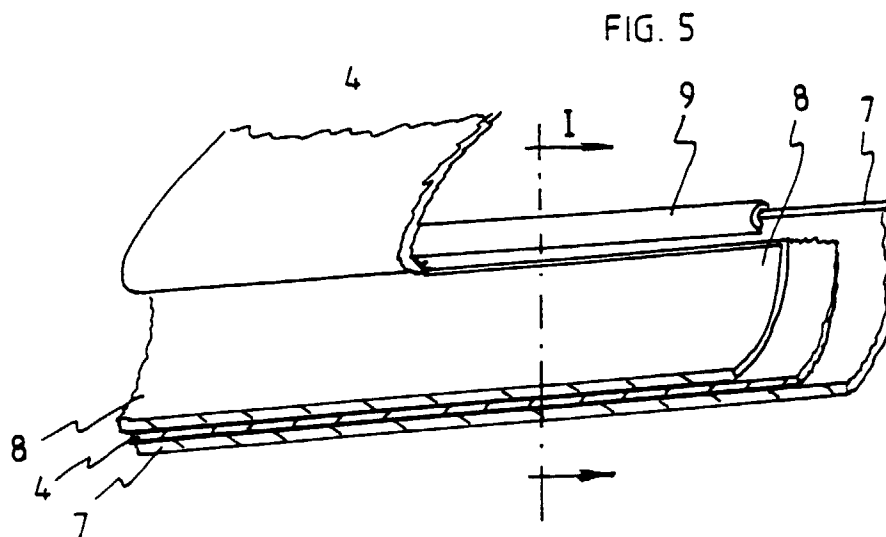


FIG. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 2806

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)
D,A	WO-A-93 18239 (ARIE VAN DORP B.V.) 16 September 1993 * the whole document *	1,3,7	E02B11/00
A	DE-U-88 04 832 (PREUSSAG AG BAUWESEN) 26 May 1988 * the whole document *	1,7	
A	FR-A-2 289 111 (TOSELLO) 28 May 1976 * page 2, line 20 - page 3, line 8; figures 1,2 *	1,7	
A	GB-A-1 514 738 (SHARMAN) 21 June 1978 * page 2, line 47 - line 65; figures 3,4 *	3	
A	DE-A-27 07 484 (GEBRÜDER UHL GMBH & CO KG) 24 August 1978 -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02B E04D E01C A01G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 January 1997	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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