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(54) Benævnelse: **DRÆNKANAL-HALVELEMENT**

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French drain half-element

The invention relates to a French drain half-element according to the preamble of claim 1. In addition, the invention also relates to a French drain component and to a receiving, storage or infiltration device which is constructed from French drain components.

French drains, which serve to receive, store or infiltrate fluids, in particular rainwater, are assembled from individual elements. In particular, French drain half-elements are used for this purpose, which have a base grate, wherein columns rise approximately perpendicularly from the base grate. Connecting devices are used to connect the French drain half-elements at the tips of the columns, i.e. at the ends of the columns opposite the base grate. For this purpose, the columns can either be placed loosely on top of each other or joined together by means of detent connections.

For example, EP 2862982 A1 discloses a module for constructing a holding basin, which has columns, which are arranged on a base grate and protrude away therefrom approximately perpendicularly. The columns, at their end pointing away from the base grate, have a surface on which there are arranged two connection means arranged next to one another at a distance, wherein the connection means are shaped congruently to one another. A first connection means is formed as a protrusion, a second connection means correspondingly as an aperture in the surface. A plurality of modules are in this way connectable to one another at their columns by means of the connection means, so that holding basins can be assembled therefrom.

When assembling the half-elements to form the French drain, a large number of columns of the individual half-elements must be positioned in relation to each other to ensure proper and precise assembly.

If small dimensional deviations occur, such as those caused for example by unintentional bending of such an element or frozen stresses resulting from production or storage of the element, it is no longer possible or very difficult to

construct a French drain. The corresponding components are either rejects or have to be reworked, which is labour-intensive and costly.

This is where the invention comes in, which addresses the problem of providing a French drain half-element that overcomes the problems mentioned above.

A further problem addressed by the present invention is that of providing a French drain component. Lastly, a further problem addressed by the present invention is that of providing a receiving, storage or infiltration device which is constructed from French drain components.

The first problem is solved in accordance with claim 1.
In the context of the present invention, it has been recognised that a French drain half-element solves the problem addressed by the present invention if it comprises a base grate and at least one column, which is connected to the base grate, projects approximately perpendicularly away from the base grate, and has, at the end opposite the base grate, a surface with a connection element, wherein the connection element is either a first connection element, which comprises a protrusion protruding from the surface, on which protrusion there is formed an outer contact face on the portion of the protrusion adjacent to the surface, or wherein the connection element is a second connection element, on which there is formed an inner contact face disposed approximately perpendicularly to the surface, wherein the first connection element and the second connection element, at least in portions, have a mutually complementary form, and to join together two French drain half-elements, the first connection element and the second connection element are each configured such that they can be plugged together, wherein, on the second connection element on the inner contact face disposed approximately perpendicularly to the surface, there is formed an insertion bevel, which adjoins the inner contact face in the direction of the base grate and which is inclined relative to the surface and is delimited by an edge of a receiving opening, which French drain half-element is characterised in that a detent protrusion is formed on the protrusion, in that the detent protrusion on the

protrusion of the first connection element at the column engages behind the edge of the second connection element and thus secures the connection of the two French drain half-elements, and in that at least one mating protrusion or at least one mating receptacle is formed on each of the surfaces of the columns.

A mating protrusion and/or a mating receptacle on the surface of the column contributes particularly to the fact that, when connecting a French drain half-element to another French drain half-element, an exact positioning of the columns of the French drain half-elements occurs, and therefore precise assembly is possible.

By way of the present invention, in particular a French drain half-element is comprises which has a plurality of columns projecting approximately perpendicularly away from the base grate.

In accordance with the invention, a surface is formed at the ends of the columns opposite the base grate with a first connection element or a second connection element. In this way, French drain half-elements are accessible which have an arrangement of columns which project approximately perpendicularly away from the base grate and at the end of which a surface with a first connection element or a second connection element is formed.

In particular, an arrangement of columns can be present in the French drain half-element according to the invention, which has a symmetry. In particular, such a half-element can have an arrangement of, for example, 4 x 3 columns, wherein the columns are arranged in a regular and, in particular, symmetrical arrangement, wherein the symmetry of the arrangement relates to the formation of the first connection elements and the second connection elements at the ends of the columns.

In the present invention, it is provided that the first connection element and the second connection element have a complementary shape, at least in portions.

This measure can ensure a particularly secure and firm connection of the French drain half-element to a further French drain half-element.

In accordance with the invention, the first connection element has a protrusion protruding from the surface, on which protrusion there is formed an outer contact face on its portion adjacent to the surface.

This measure makes it easy to create a secure and precisely fitting connection between one French drain half-element and another French drain half-element.

In the context of the present invention, it can prove to be very advantageous if it is provided that the protrusion has an end that is rounded or pointed.

This measure makes it very easy to plug together two French drain half-elements.

In accordance with the invention, it is provided that a detent protrusion is formed on the protrusion having the first connection element. By providing a detent protrusion formed on the protrusion, a detent connection between one French drain half-element and a further French drain half-element connected thereto is formed in a simple manner.

This makes it possible to ensure a particularly firm connection between one French drain half-element and another French drain half-element.

In accordance with the invention, it is provided that an inner contact face bounded by the surface is formed on the second connection element, as well as an insertion bevel adjoining it in the direction of the base grate, which insertion bevel is inclined with respect to the surface and is bounded by an edge of a receiving opening.

A second connection element embodied in this way is very particularly suitable for forming a firm connection to a first connection element when the two are

plugged together. In this way, French drain half-elements can be easily and securely connected to each other.

In a very preferred development of the present invention, it can be provided that the outer contact face of the first connection element and the inner contact face of the second connection element have a mutually complementary form.

This measure makes it possible to bring the outer contact face formed on the first connection element and the inner contact face formed on the second connection element into contact when the first connection element and the second connection element are plugged together, so that the first connection element and the second connection element are positioned precisely and securely, as a result of which the French drain half-element is connected to a further French drain half-element in a very particularly secure manner.

In accordance with the invention, both mating protrusions and mating receptacles are formed on the surfaces of the columns.

In the present invention is may prove to be particularly advantageous if it is provided that the French drain half-element consists of or contains a polymer material, wherein the polymer material is preferably a thermoplastic polymer material, in particular a polyolefin, such as a polyethylene, polypropylene, polybutylene or a copolymer of the aforementioned or a mixed composition of the aforementioned, or a polyvinyl chloride or a polyester or a polycarbonate.

The above-mentioned polymer materials are easy to mould, inert, durable, mechanically and chemically stable, resilient and inexpensive to purchase. French drain half-elements can be easily formed from the polymer materials mentioned. This can be achieved, for example, in an injection moulding process or in another polymer processing and forming process.

Alternatively, it is also possible for the French drain half-element to be produced using a generative manufacturing process, in particular in one piece, for example using a 3D printing process.

For this purpose, three-dimensional models that can be read by data processing machines can be used with advantage for production.

The French drain half-element can be produced in whole or in part using a line-building or layer-building manufacturing process.

In particular, the French drain half-element can be produced in whole or in part in rows or layers by applying a material.

A 3D data set can be used with great advantage during assembly or production.

The solution of the further problem addressed by the present invention to provide a French drain component is according to claim 6.

In the context of the present invention, it has been recognised that a French drain component is accessible in a simpler manner if it is provided that two French drain half-elements are connected to each other as described above. This can be realised in such a way that the first French drain half-element has a first connection element on the at least one column and the second French drain half-element has a second connection element on the at least one column, and wherein the first connection element and the second connection element can be plugged together, whereby the two French drain half-elements can be connected to each other to form the French drain component.

Such French drain components can in particular be formed from similarly shaped French drain half-elements in such a way that, in the case of a plurality of columns, each column is connected to a column of the further French drain half-element, so that there are no unconnected columns in the two French drain half-elements.

In another connection situation, it can be provided that the first French drain half-element with a plurality of columns is connected to a second French drain half-element with a plurality of columns in such a way that not all columns are connected to each other, so that there are still unconnected columns. In this installation situation, it is possible, for example, to create a "masonry composite", wherein the French drain half-elements are arranged for example in such a way that they are each connected to two further French drain half-elements.

However, there are also other installation situations in which more than two French drain half-elements are connected to one French drain half-element.

The final problem addressed by the present invention, to provide a receiving, storage or infiltration device, is solved in accordance with claim 8.

It has been recognised in the present invention that a receiving, storage or infiltration device is particularly technically enhanced if it is constructed from a plurality of French drain components as described above.

Such a receiving, storage or infiltration device can be used in a particularly preferred manner as a French drain, a retention basin or a storage basin. In a development of the present invention, such a receiving, storage or infiltration device is surrounded by a fleece so that no soil is washed into the device from the outside or so that no solids from the interior enter the soil.

The present invention has a wide range of applications in the field of rainwater management. However, the invention can also be used with great advantage in industrial applications, in swimming pools, in agriculture and pond management, as well as in other areas.

Further important features and advantages of the invention can be found in the dependent claims, in the figures and in the associated description of the figures.

The present invention is described as follows with reference to the attached figures, in which:

Fig. 1 shows a schematic perspective view of a column of a French drain half-element with a first connection element;

Fig. 2 shows a schematic perspective view of a column of a French drain half-element with a second connection element;

Fig. 3 shows a schematic cross-sectional view of the positioning of the first connection element and the second connection element for the connection of two French drain half-elements;

Fig. 4 shows a schematic cross-sectional view of the insertion of the first connection element into the second connection element during the connection of two French drain half-elements;

Fig. 5 shows a schematic cross-sectional view of two French drain half-elements connected to one another by the first connection element and the second connection element;

Fig. 6 shows a schematic perspective view of a French drain half-element.

Fig. 1 shows a schematic perspective view of a column 1 of a French drain half
element 18 with a first connection element 5.

The column 1 of the French drain half-element 18, not shown here, is only partially depicted in Fig. 1, in particular the end 3 of the column 1 is shown. The French drain half-element 18 is shown in Fig. 6.

A surface 4, on which a first connection element 5 is arranged, is formed at the end 3 of the column 1 of the French drain half-element 18. The first connection element 5 is moulded on the surface 4 of the column 1 in the centre of its cross-section at the end 3 of the column 1.

The first connection element 5 has a protrusion 6 that rises from the surface 4. The protrusion 6 has a cylindrical surface. The end 14 of the protrusion 6 is rounded. A detent protrusion 13 is provided on the protrusion 6.

At the base of the protrusion 6, which directly adjoins the surface 4 of the column 1, an outer contact face 7 is formed, which is shaped as a cylindrical surface. The outer contact face 7 of the first connection element 5 is approximately perpendicular to the surface 4 of the column 1.

On the surface 4, there are also four mating recesses 16 in the form of apertures through the surface 4. The four mating recesses 16 on the surface 4 of the column 1 have an angular distance of 90° to their immediate neighbours. All four mating recesses 16 have the same size.

Fig. 2 shows a schematic perspective view of a column 1 of a French drain half-element 8 with a second connection element 8. Here, too, only the end 3 of the column 1 of the French drain half-element 18, which is not shown, is shown.

A surface 4, on which a second connection element 8 is arranged, is formed at the end 3 of the column 1 of the French drain half-element 18.

The second connection element 8 is moulded at the end 3 of the column 1 on the surface 4 of the column 1 in the centre of its cross-section.

The second connection element 8 on the surface 4 of the column 1 has an inner contact face 10, which is designed as a cylindrical surface and is approximately perpendicular to the surface 4 of the column 1.

The inner contact face 10 of the second connection element 8 is shaped in a manner complementary to the outer contact face 7 of the first connection element 5 as shown in Fig. 1. This allows the first connection element and the second connection element 8 to be plugged together.

The inner contact face 10 of the second connection element 8 of the column 1 is adjoined in the direction of the base grate 2 by an insertion bevel 9, which in Fig. 2 is formed as a cone portion surface. The insertion bevel 9 is bounded by an edge 12, which surrounds a receiving opening 11.

As alternatives to such an insertion bevel 9 in the form of a conical portion surface, which are not shown, pyramidal portion surfaces or spherical portion surfaces or ellipsoidal portion surfaces or ones which are proportionally composed of the aforementioned are also suitable.

The second connection element 8 of the column 1 of the French drain half-element 18 is dimensioned in such a way that the first connection element 5 of the column 1 of the French drain half-element 18 can be inserted into it.

As a result, the first connection element 5 of the column 1 of a French drain half-element 18 and the second connection element 8 of the column 1 of a neighbouring other French drain half-element 18 can be plugged together, thus connecting the French drain half-elements 18 to one another.

Four mating protrusions 15 are formed on the surface 4 of the column 1 of the French drain half-element 18. The mating protrusions 15 on the surface 4 of the column 1 are shaped as cylinders and have an angular distance of 90° to their respective immediate neighbours.

The mating protrusions 15 are dimensioned so that they can be inserted into the mating receptacles 16 on the surface 4 of the column 1 as shown in Fig. 1. All mating protrusions 15 have the same size.

Fig. 3 shows a schematic cross-sectional view of the positioning of the first connection element 5 and the second connection element 8 for the connection of two French drain half-elements 18.

In order to connect two French drain half-elements 18 to one another, the two columns 1, 1 of the French drain half-elements 18 oriented adjacently to one another, which are arranged in such a way that the ends 3 of the columns 1 of the two French drain half-elements 18 point towards one another, and of which one column 1 has a first connection element 5 and one column 1 has a second connection element 8, must be positioned in such a way that the protrusion 6 of the first connection element 5 on the column 1 of a French drain half-element 18 is approximately opposite the receiving opening 11 of the second connection element 8 on the column 1 of the neighbouring French drain half-element 18.

As the two French drain half-elements 18 move closer together, the protrusion 6 can thus be easily moved in the direction of the receiving opening 11 with the aid of the insertion bevel 9, wherein the end 14 of the protrusion 6 can slide along the insertion bevel 9 in the direction of the receiving opening 11 and is guided towards it.

In particular, if the column 1 of the French drain half-element is positioned imprecisely with the first connection element 5 and the column 1 of the French drain half-element 18 with the second connection element 8, a simple connection can then take place.

Such imprecise positioning can be caused by fundamental errors on the part of the personnel installing such French drain half-elements, but also by faulty products which, for example, exhibit production-related stresses or are otherwise bent or have undergone small changes in shape.

Fig. 4 shows a schematic cross-sectional view of the insertion of the first connection element 5 into the second connection element 8 during the connection of two French drain half-elements 18.

The reference signs in Fig. 4 correspond to those in the previous figures.

In the illustration according to Fig. 4, the protrusion 6 of the first connection element 5 has already penetrated a little way through the receiving opening 11 of the second connection element 8 into the free space 17 of the column 1.

The columns 1 are hollow on the inside and have a free space 17.

This results in a centring when positioning the two French drain half-elements 18 when the first connection element 5 is plugged into the second connection element 8, which has the effect that the mating protrusions 15 on the French drain half-element 18 with the second connecting means 8 are then also aligned in such a way that they are opposite the mating receptacles 16 on the French drain half-element 18 with the first connecting means 5.

Fig. 5 shows a schematic cross-sectional view of two French drain half-elements 18 connected to each other by the first connection element 5 and the second connection element 8.

Here, the protrusion 6 of the first connection element 5 is fully inserted into the receiving opening 11 of the second connection element 8. Here, the outer contact face 7 of the first connection element 5 is brought into contact with the inner contact face 10 of the second connection element 8.

The mating protrusions 15 on the surface 4 of the column 1 with the second connection element 8 are inserted into the mating receptacles 16 on the surface 4 of the column 1 with the first connection element 5, but this is not shown.

The detent protrusion 13 on the protrusion 6 of the first connection element 5 on the column 1 engages behind the edge 12 of the second connection element 8 and thus secures the connection of the two French drain half-elements 18.

The two French drain half-elements 18 are thus interlocked and in this way form the French drain component 19.

Fig. 6 shows a schematic perspective view of a French drain half-element 18. The French drain half-element 18 has a large number of columns 1 that extend approximately perpendicularly from a base grate 2 in one direction.

The French drain half-element 18 shown in Fig. 6 has three rows of columns 1 in the spatial direction x. Four rows of columns 1 are formed in the spatial direction y.

In this way, twelve columns 1 are formed on the French drain half-element 18 as shown in Fig. 6.

The columns 1 have either a first connection element 5 or a second connection element 8 on their surface 4, which connection element is formed at the end 3 of the columns 1.

In the embodiment shown according to Fig. 6, the three columns of each row in the spatial direction x each have a first connection element 5 or a second connection element 8.

In this way, a mirror plane is formed in the French drain half-element 8 shown in Fig. 6 and runs in spatial direction y through the centre of the middle columns 1, which are arranged in spatial direction x.

It is understood that other arrangements are also possible with regard to the formation of the first connection elements 5 or the second connection elements 8 on the columns 1, wherein symmetrical arrangements are preferred.

By connecting the first connection elements 5 to the second connection elements 8, a French drain component 19 for the construction of a receiving,

storage or infiltration device 20 can be formed from the French drain half-element 18 in a simple manner with a further similar French drain half-element 18, which is rotated by 180° about the x-axis (spatial direction x) or by 180° about the y-axis (spatial direction y).

For this purpose, a French drain half-element 18 can be connected to a further French drain half-element 18 in such a way that there are no unused first connection elements 5 or second connection elements 8.

In another connection technique, however, a French drain half-element 18 can also be connected to a further French drain half-element 18 in such a way that first connection elements 5 and/or second connection elements 8 are still unused on both French drain half-elements 18, so that a "masonry composite" is possible.

In a "masonry composite", a French drain half-element 18 is connected to at least two other French drain half-elements 18, resulting in increased stability of the French drain component 19 and thus of the collection, storage or infiltration device 20 to be constructed in this way.

The French drain half-elements 18 are shaped in such a way that they can be stacked on top of each other in a space-saving manner, wherein a column 1 of a lower French drain half-element 1 is inserted into the free space 17 of a column 1 of a French drain half-element 18 arranged above it.

Patentkrav

1. Drænkanal-halvelement (18), omfattende et basisgitter (2) og en flerhed af støtter (1), der er forbundet med basisgitteret (2), står omtrent lodret ud fra basisgitteret (2) og i den ende (3), der ligger modsat basisgitteret (2), hver har en overflade (4), på hvilken der er anbragt enten et første forbindelseselement (5) eller et andet forbindelseselement (8), hvor det første forbindelseselement (5) har et fremspring (6), der stikker frem fra overfladen, på hvilket fremspring der på afsnittet ved siden af overfladen (4) er udformet en udvendig kontaktflade (7), og hvor der på det andet forbindelseselement (8) er udformet en indvendig kontaktflade (10), der står omtrent lodret i forhold til overfladen (4), hvor det første forbindelseselement (5) og det andet forbindelseselement (8) i det mindste afsnitsvist har en til hinanden komplementær form, hvor til sammenføjning af to drænkanal-halvelementer de respektive første (5) og yderligere forbindelseselementer (8) er udformet, så de kan sættes sammen, hvor der på det andet forbindelseselement (8) på den i forhold til overfladen (4) omtrent lodret stående indvendige kontaktflade (10) er udformet en herpå i retning mod basisgitteret (2) tilsluttende indføringsskråkant (9), som hælder i forhold til overfladen (4) og er begrænset af en kant (12) på en optagsåbning (11), kendetegnet ved, at der på fremspringet (6) er udformet et låsefremspring (13), og at der på støtternes (1) respektive overflader (4) er udformet mindst et passende fremspring (15) eller mindst et passende optag (16).

2. Drænkanal-halvelement (18) ifølge krav 1, kendetegnet ved, at de passende fremspring (15) er sådan dimensionerede, at de kan stikkes ind i de passende optag (16).

3. Drænkanal-halvelement (18) ifølge et af de foregående krav, kendetegnet ved, at fremspringet (6) har en ende (14), som er udformet afrundet eller spidst.

4. Drænkanal-halvelement (18) ifølge et af de foregående krav, kendetegnet ved, at den udvendige kontaktflade (7) af det første forbindelseselement (5) og den indvendige kontaktflade (10) af det andet forbindelseselement (8) har en til hinanden komplementær form.

5. Drænkanal-halvelement (18) ifølge et af de foregående krav, kendetegnet ved, at dette består af et polymermateriale eller indeholder et sådant, hvor polymermaterialet foretrukket er et termoplastisk polymermateriale, særligt en polyolefin, som eksempelvis polyethylen, polypropylen, polybutylen eller en copolymer af

førnævnte eller en blandingssammensætning af førnævnte, eller en polyvinylchlorid eller en polyester eller en polycarbonat.

6. Drænkanalelement (19) af to drænkanal-halvelementer (18) forbundet med hinanden ifølge et af kravene 1 til 5, hvor det respektive første (5) og andet forbindelseselement (8) af de to drænkanal-halvelementer (18) er sat sammen, og forbinder de to drænkanal-halvelementer (18) med hinanden.

7. Drænkanalelement (19) af to drænkanal-halvelementer (18) forbundet med hinanden ifølge et af kravene 1 til 5, hvor det respektive låsefremspring (13) på fremspringet (6) af det første forbindelseselement (5) på støtten (1) griber ind bag kanten (12) af det andet forbindelseselement (8) og på den måde sikrer forbindelsen af de to drænkanal-halvelementer (18).

8. Optags-, lagrings- eller nedsivningsanordning (20) af en flerhed af drænkanal-halvelementer (19) ifølge krav 7.

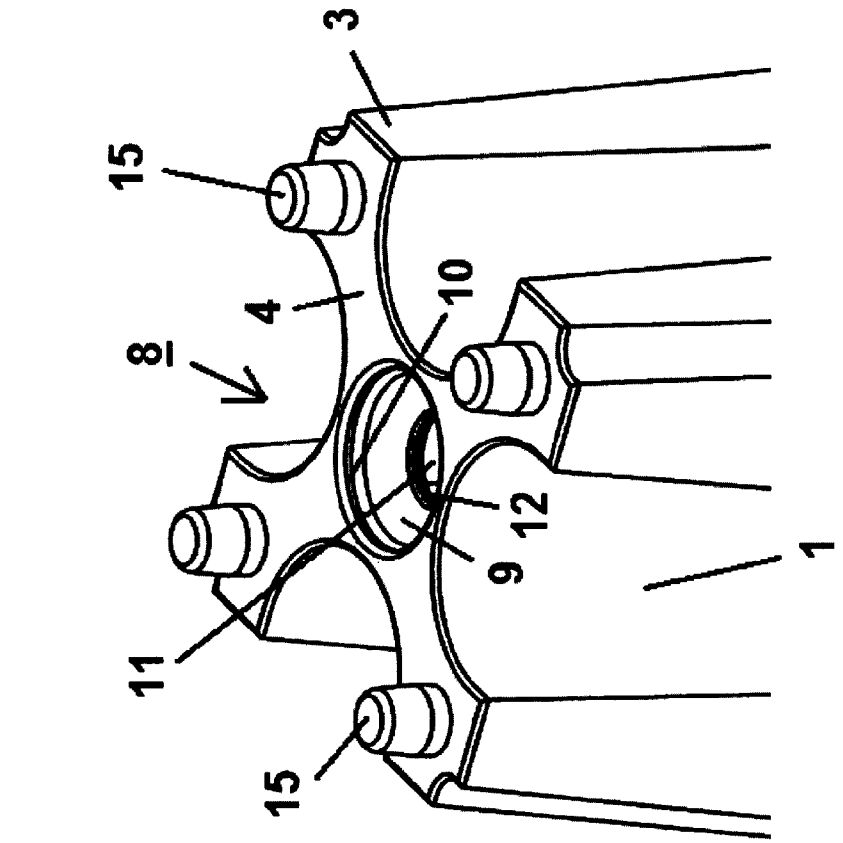

Fig. 2

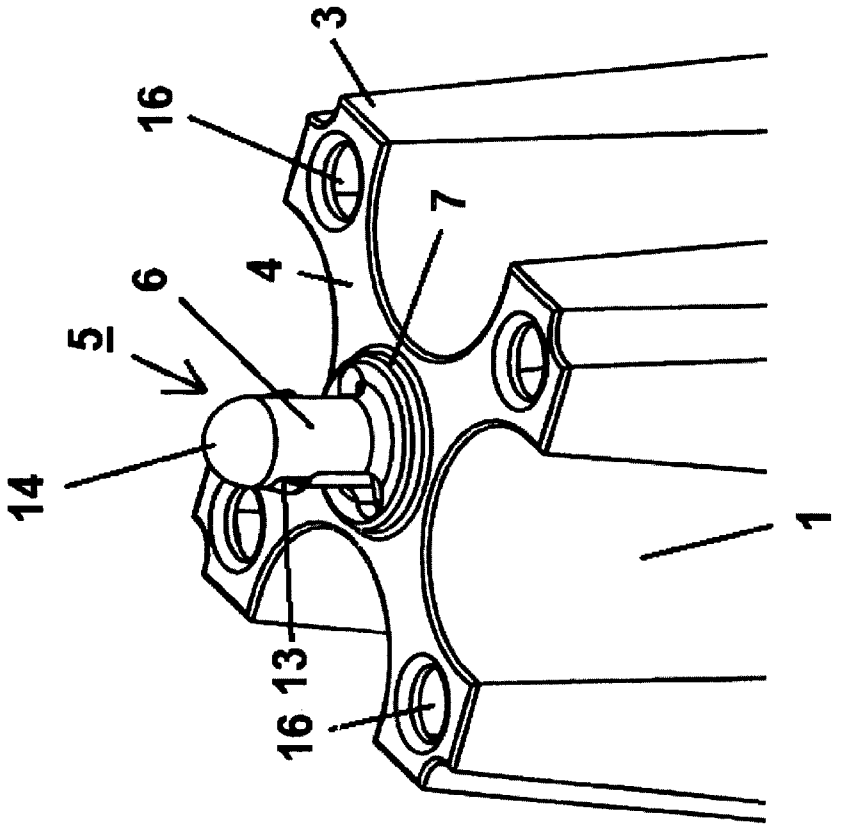

Fig. 1

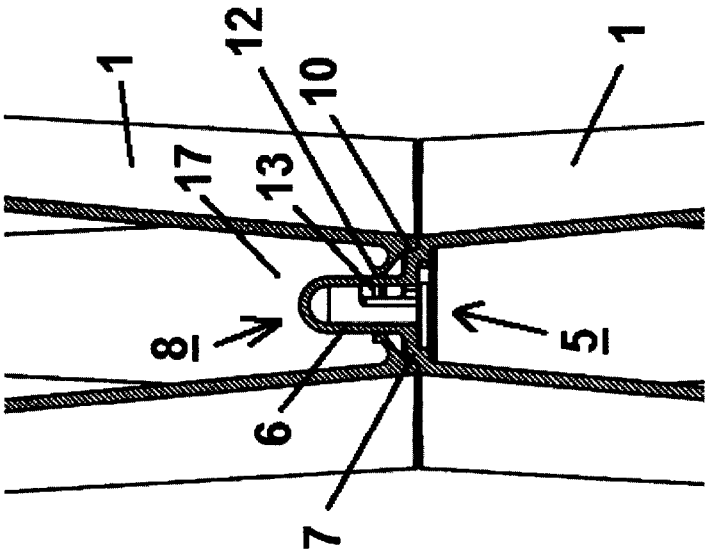

Fig. 5

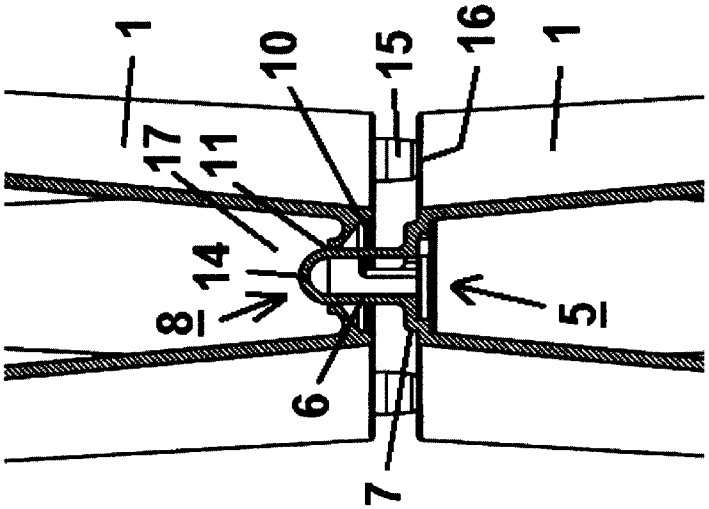

Fig. 4

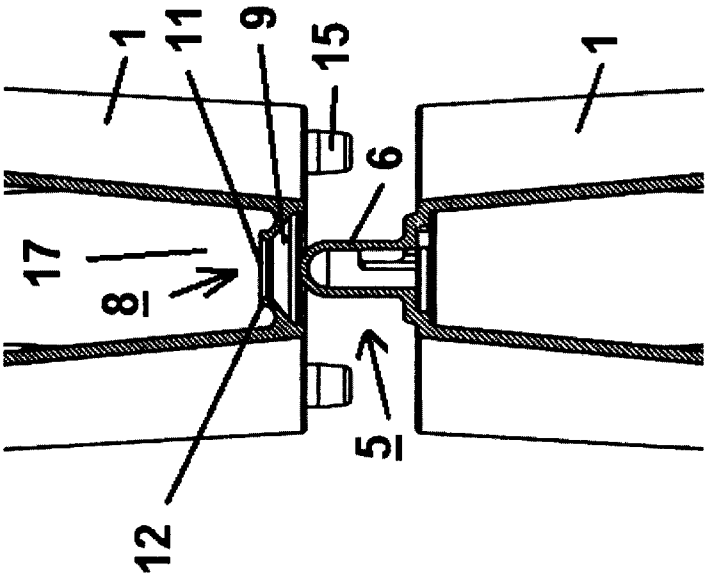

Fig. 3

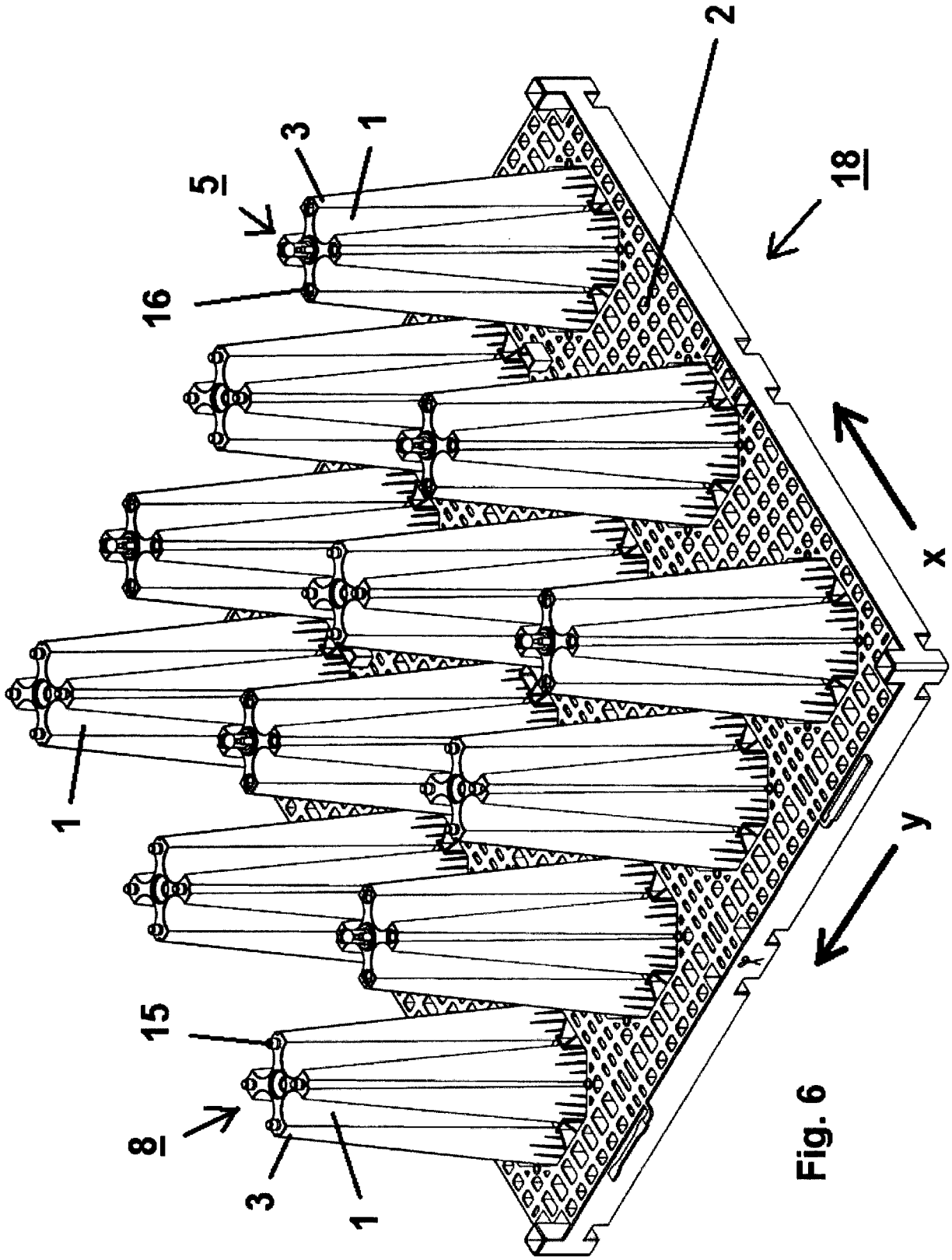

Fig. 6