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(54) **Drainage grating for liquids and associated support**

Drainagerost für Flüssigkeiten und zugehörige Halterung

Grille de drainage pour des liquides et support associé

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EP-A- 0 668 408
FR-A- 2 652 839
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Description

[0001] The present invention relates to a modular drainage grating for liquids in general, and in particular for meteoric water and backflow water, to be installed, in association with a channel support element, in ground surfaces which are subject to a high density of traffic and have a high load-bearing capacity, so as to collect these liquids by means of percolation and remove them by conveying them away to a known evacuation system.

[0002] In the art, drainage gratings associated with a corresponding support element are known, said gratings consisting of longitudinally extending modular elements which are intended to be installed in series with one another so as to form a single functional grating of unlimited length. Such a grating associated with a support element is described in document EP-A-0 668 408.

[0003] These known modular elements consist substantially of a strong upper grating made of metallic material such as, for example, nodular cast iron or steel, and having an elongated rectangular shape provided with four holes on the external perimeter in the vicinity of the ends, intended for engaging the grating by means of bolts in corresponding fixing seats formed in the upper part of the channel element forming the grating support.

[0004] These known gratings with associated channel support element, when they are subjected to heavy traffic as, for example, in the parking bays of a road haulage depot, or at an airport, have the drawback, however, that they develop weaknesses at the joints, therefore resulting in discontinuities in the profile of the ground in which they are installed, with obvious major negative consequences.

[0005] These weaknesses generally consist in sinking of a channel element with associated grating at the joining point with an adjacent element, resulting in the formation of a step which interrupts the continuity of the profile of the grating, creating a bumpy travel surface for traffic, subjecting tyres to dangerous stresses and resulting in difficulties in collection of the rainwater.

[0006] Moreover, this step in the region of a joint forms an interruption in the bottom seal of the channel and therefore results in undesirable seepage of liquid into the subsoil.

[0007] Said weaknesses are caused by the varying pressure exerted, in the region of a joint, by the traffic on the subsurface for laying of the grating support channel, these being associated with inevitable discontinuities present in the ground.

[0008] An object of the present invention is to provide a modular drainage grating for liquids, and in particular for meteoric water and backflow water, with associated channel support element, which does not produce any discontinuity at the joint between one grating and the next one even in the case of varying sinking of one support element with respect to the adjacent one. Another object is to obtain a smaller and better distributed pressure on the subsurface for laying of the channel, therefore partly eliminating the main cause of sinking of a support element with respect to another element adjacent thereto.

[0009] A further object is to provide a grating with associated channel support element which allows laying using the known technology employed hitherto, therefore leaving the design engineer the possibility of choosing whether to use a grating of the traditional type or a grating of the new type.

[0010] These objects are achieved by staggering the joints of the channel support elements with respect to the joints of the overlying series of gratings, thus resulting in the middle of a grating being located opposite the joint of the support elements, said grating thus being fixed to the two adjacent support elements.

[0011] The invention will emerge more clearly from the description of three examples of application provided hereinbelow with the aid of five plates of drawings.

[0012] In these plates:

Fig. 1 and Fig. 2 show respectively a drainage grating and the associated channel support element, realized in accordance with the invention in a first example of application where the grating 1 and the associated support element 10 have the same module length, the grating module G having the same length as the support element module E;

Figs. 3 and 4 show respectively a plan view and an elevation view of two gratings which are mounted on the respective support element using a known construction technique;

Figs. 5 and 6 show details of the system for securing a grating to the associated support element in the example illustrated above;

Figs. 7 and 8 show respectively a plan view and an elevation view of two support elements with associated upper grating mounted in accordance with the invention, i.e. with lengthwise staggering of grating and support element, equivalent to half the length of the grating;

Figs. 9 and 10 show details of the grating bearing zone in the middle and at the ends of said grating;

Fig. 11 shows a functional example of the behaviour of a continuous grating realized in accordance with the invention when a weakness occurs at the ends of a support element;

Fig. 12 shows a diagram illustrating laying of a set of 3 modular elements with a length L; while

Figs. 13 and 14 show respectively a plan view and a cross-sectional view of a support element;

Fig. 15, finally, shows an accessory component of a continuous grating, consisting of a support element having a length equal to half that of the grating module, to be inserted respectively at the start and at the end of the series consisting of the support elements 10, so as to obtain staggering of the gratings and associated support elements;

Figs. 16 and 17 show two other examples of appli-

cation.

[0013] With reference to these Figures, 1 denotes a water drainage grating consisting of a plate of considerable thickness with an elongated rectangular shape having, formed in it, a uniform plurality of through-slits 2 and provided at its corners with four through-holes 3, 3'; 4, 4' formed in a niche which opens outwards at the top. D denotes the value of the longitudinal distance between the holes 3 and 3', or 4 and 4', on the grating 1.

[0014] 10 denotes a channel support element which is made, for example, of a cement mix with suitable known additives, i.e. synthetic resin to which inert materials of a known type and grain size have been added, and which has a substantially U-shaped configuration, an L-shaped metal section 5 for the bearing support of the grating 1 being provided at the top of each of the two walls 8 and 9 of the element 10 and four vertical threaded holes 6, 6'; 7, 7' being formed on this section.

[0015] The metal section 5 is manufactured separately and laid integrally with the channel support element 10 by means of cemented side flanges.

[0016] 11 denotes four bolts which are intended to engage respectively inside end threaded holes 6, 6', or in the region of the central part 7, 7', depending on the method used for mounting the grating 1.

[0017] Figs. 3 and 4 illustrate, in fact, a first method of mounting the grating 1 on the support element 10, using a traditional technique which involves each grating coinciding exactly with the associated support element 10, i.e. in alignment.

[0018] It is envisaged, therefore, that the bolts 11 engage respectively inside the holes 4, 4' of the grating 1 and the threaded holes 6, 6' of the support element 10, it being envisaged in the example of application that the length E of each support element 10 is equal (subject to minor tolerances) to the length G of each grating 1. In this traditional assembly condition, the intermediate threaded holes 7, 7' on each wall 8, 9 of the support element 10 will therefore not be used, while the holes 6, 6', which are located at a distance A from each end of the support element 10, equal to the distance of the holes 3,3'; 4,4' from the end of the grating 1, will be used.

[0019] Figs. 7 and 8 show, respectively, a plan view and an elevation view of a second method of mounting the grating 1 on the support element 10, where the grating 1 is staggered lengthwise with respect to the support element by an amount S equal to half of G.

[0020] This is obtained by forming in the central part of each module 10, on the walls 8 and 9, a pair of vertical threaded holes 7, 7' which are located at a distance D/2 from the ends of each support element 10, i.e. half the distance D, and engaging the holes 3,3'; 4,4' of the grating 1 with the corresponding threaded holes 7, 7' . These holes 7, 7' are positioned symmetrically with respect to the middle of the support element 10.

[0021] In this case, the peripheral threaded holes 6, 6' at the ends of the element 10 are not used.

[0022] The values of the distances of the abovementioned holes are obviously understood as being subject to the normal working tolerances in the sector of prefabricated building products.

[0023] Fig. 11 illustrates the behaviour of the grating 1 with associated support element 10 which is laid in a continuous series of undefined length, in the event of sinking of a support element, shown in the centre of Fig. 11. It can be seen that sinking of the support element 10 does not affect the continuity of the grating 1, lowering of which is even less than lowering of the support element.

[0024] The bearing force of the grating 1 on the ground is moreover better distributed since it is applied to half of each support element 10.

[0025] Fig. 12 shows, again according to a first example of application where G=E, a diagram illustrating laying of the set of three modular grating elements 1 on associated support elements; in this diagram it can be seen that, in order to achieve lengthwise staggering of the gratings and support elements, an element 10' with a length S (Fig. 14) equal to half the length G of a grating module is laid at the start and at the end of the series of support elements.

[0026] Figs. 16 and 17 show two other examples of application in which the grating module G is respectively half and one third of the module E of the channel support element. In these cases also, two elements 10' with a length S equal to half the grating module G are laid at the start and at the end of the series of support elements 10.

[0027] In all cases the distance, from the end of the support element 10, of the holes 7, 7' arranged on the support element 10 to be fixed to the grating 1 is equal to half (D/2) the longitudinal distance D between the holes 3 and 3'; 4 and 4' of the grating.

[0028] Obviously the invention may be subject to variations of application for obtaining lengthwise staggering of the grating 1 and the support element 10; for example, this staggering may be obtained by inserting at the start and at the end of the series of gratings a shorter grating having a length S equal to half the grating module G.

[0029] It is thus possible to achieve the objects of: distributing better the pressure on the ground caused by loads acting on the grating 1; avoiding the formation of steps or discontinuities in the event of sinking of a support element; and also limiting sinking of the grating when said sinking of the corresponding support occurs. The further object is also achieved of being able to perform, as desired, laying of an unlimited series of gratings 1 with associated support element, either using the traditional technique without any staggering of grating and support (Figs. 3 and 4) or using a new technique which performs staggering equivalent to half the module G (Figs. 7 and 8; Fig. 16).

[0030] Obviously, together with the holes 7, 7' intended to fix a grating 1 with its middle opposite a joint of the support elements 10, other holes 6, 6, for also allowing

a laying arrangement in which the joints of the grating coincide with the joints of the support element 10, may be provided.

Claims

1. Modular drainage grating (1) for liquids in general, with associated modular support element (10), consisting of a metal section (5) and of a substantially U-shaped, longitudinally extending channel with walls (8, 9) provided with means (7, 7') for performing fixing to the overlying grating, which are such as to allow staggering of the joints of the channel support elements with respect to the joints of the overlying series of gratings;
the fixing means consisting of bolts (11) in vertical holes (7, 7') which vertical holes (7, 7') are threaded and positioned symmetrically with respect to the middle of the support element (10);
the metal section (5), arranged between the grating (1) and the channel support element (10), being provided separately and being then laid integrally with the channel support element (10) by means of cemented flanges;
characterized in that the walls (8, 9) of the modular channel support element (10) are provided with at least one pair of vertical holes (7, 7') which are symmetrically located at a distance (D/2) from the ends of each support element 10 equal to half the longitudinal interaxial distance between the holes (3,3'; 4,4') of the corresponding grating for engaging the holes (3, 3', 4, 4') of the grating with the corresponding vertical holes (7, 7').

2. Drainage grating (1) and associated channel support element (10) according to the preceding Claim 1, **characterized in that**, in addition to the fixing means (7,7') described above, fixing means (6,6') are also provided for allowing fixing of the grating and associated support means so that the associated joints coincide.

3. Drainage grating (1) and associated channel support element (10) according to the preceding claims, **characterized in that** it also comprises two identical support elements (10') having a length S equal to half the length of the grating module (G).

4. Drainage grating (1) and associated channel support element (10) according to the preceding claims, **characterized in that** the series of gratings (1) also comprises two identical grating elements having a length (S) equal to half the grating module (G).

Patentansprüche

1. Modularer Drainagerost (1) für Flüssigkeiten allgemein, mit zugehörigem modularen Halteelement (10), bestehend aus einem Metallprofil (5) und aus einem im wesentlichen U-förmig ausgebildeten, sich in Längsrichtung erstreckenden Kanal mit Wänden (8, 9), versehen mit Mitteln (7, 7') zum Befestigen des darüber liegenden Rostes, welche solche sind, die ein Versetzen der Verbindungsstellen des kanalförmigen Halteelementes im Verhältnis zu den Verbindungsstellen der darüber liegenden Serie von Rosten erlauben; wobei die Befestigungsmittel aus Bolzen (11) bestehen, die in vertikale Bohrungen 7, 7' greifen, welche vertikalen Bohrungen 7, 7' mit Gewinde versehen und symmetrisch im Verhältnis zu der Mitte des Halteelementes (10) positioniert sind; wobei das zwischen dem Rost (1) und dem kanalförmigen Halteelement (10) angeordnete Metallprofil (5) getrennt vorgesehen ist und dann mit Hilfe von zementierten Verankerungen zusammen mit dem kanalförmigen Halteelement (10) verlegt wird; **dadurch gekennzeichnet, dass** die Wände (8, 9) des modularen kanalförmigen Halteelementes (10) mit wenigstens einem Paar von vertikalen Bohrungen (7, 7') versehen sind, welche symmetrisch mit einem Abstand (D/2) von den Enden eines jeden Halteelementes (10) angeordnet sind, welcher der Hälfte des Achsabstandes in Längsrichtung zwischen den Bohrungen (3, 3'; 4, 4') des entsprechenden Rostes entspricht, um die Bohrungen (3, 3'; 4, 4') des Rostes mit den entsprechenden vertikalen Bohrungen (7, 7') zu verbinden.

2. Drainagerost (1) und zugehöriges kanalförmiges Halteelement (10) nach dem vorstehenden Patentanspruch 1, **dadurch gekennzeichnet, dass** zusätzlich zu den oben beschriebenen Befestigungsmitteln (7, 7') auch Befestigungsmittel (6, 6') vorgesehen sind, um das Verbinden des Rostes mit dem zugehörigen Halteelement auf solche Weise zu erlauben, dass die zugeordneten Verbindungsstellen übereinstimmen.

3. Drainagerost (1) und zugehöriges kanalförmiges Halteelement (10) nach den vorstehenden Patentansprüchen, **dadurch gekennzeichnet, dass** auch zwei gleiche Halteelemente (10') vorgesehen sind, die eine Länge (S) gleich der Hälfte der Länge des Rostbauteils (G) haben.

4. Drainagerost (1) und zugehöriges kanalförmiges Halteelement (10) nach den vorstehenden Patentansprüchen, **dadurch gekennzeichnet, dass** die Serie von Rosten (1) auch zwei gleiche Rostbauteile enthält, die eine Länge (S) gleich der Hälfte der Länge des Rostbauteils (G) haben.

Revendications

1. Grille de drainage modulaire (1) pour liquides en général, avec élément du support modulaire (10) associé, consistant en une section métallique (5) et en un canal à développement longitudinal substantiellement en forme de U avec des parois (8, 9) pourvues de moyens (7, 7') pour réaliser la fixation de la grille située au-dessus, qui sont tels qu'ils permettent un décalage des jonctions des éléments de support formant le canal par rapport aux jointures des séries de grilles situées au-dessus; les moyens de fixation consistant en des boulons (11) dans des orifices verticaux (7, 7') lesquels orifices sont filetés et positionnés symétriquement par rapport au centre de l'élément de support (10); la section métallique (5), disposée entre la grille (1) et l'élément de support formant le canal (10), étant fournie séparément et étant mise en oeuvre solidairement de l'élément de support formant le canal (10) au moyen de brides cimentées;
caractérisée en ce que les parois (8, 9) de l'élément de support modulaire formant le canal (10) sont pourvues d'au moins une paire d'orifices verticaux (7, 7') qui sont symétriquement disposés à une distance (D/2) des extrémités de chaque élément de support (10) égale à la moitié de la distance d'entraxe longitudinale entre les orifices (3, 3'; 4, 4') de la grille correspondante pour engager les orifices (3, 3'; 4, 4') de la grille avec les orifices verticaux (7, 7') correspondants.

2. Grille de drainage (1) et élément de support formant le canal (10) associé selon la revendication précédente 1, **caractérisée en ce que**, outre les moyens de fixation (7, 7') décrits ci-dessus, des moyens de fixation (6, 6') sont également prévus pour permettre la fixation de la grille et des moyens de support associés de manière à ce que les jointures associées coïncident.

3. Grille de drainage (1) et élément de support formant le canal (10) associé selon les revendications précédentes, **caractérisée en ce qu'**elle comprend également deux éléments de support (10) identiques ayant une longueur S égale à la moitié de la longueur du module de grille (G).

4. Grille de drainage (1) et élément de support formant le canal (10) associé selon les revendications précédentes, **caractérisée en ce que** les séries de grilles (1) comprennent également deux éléments de grille identiques ayant une longueur (S) égale à la moitié du module de grille (G).

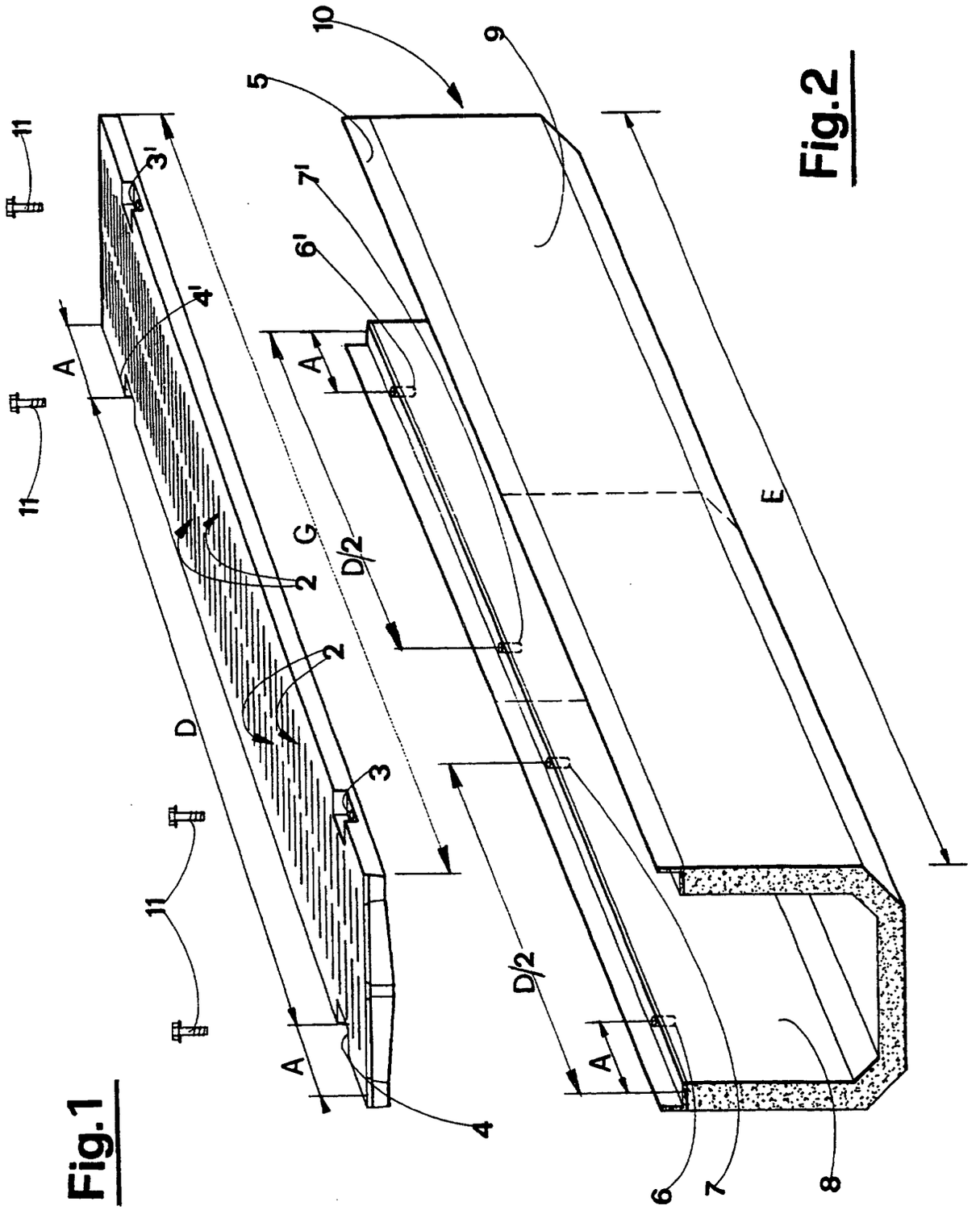
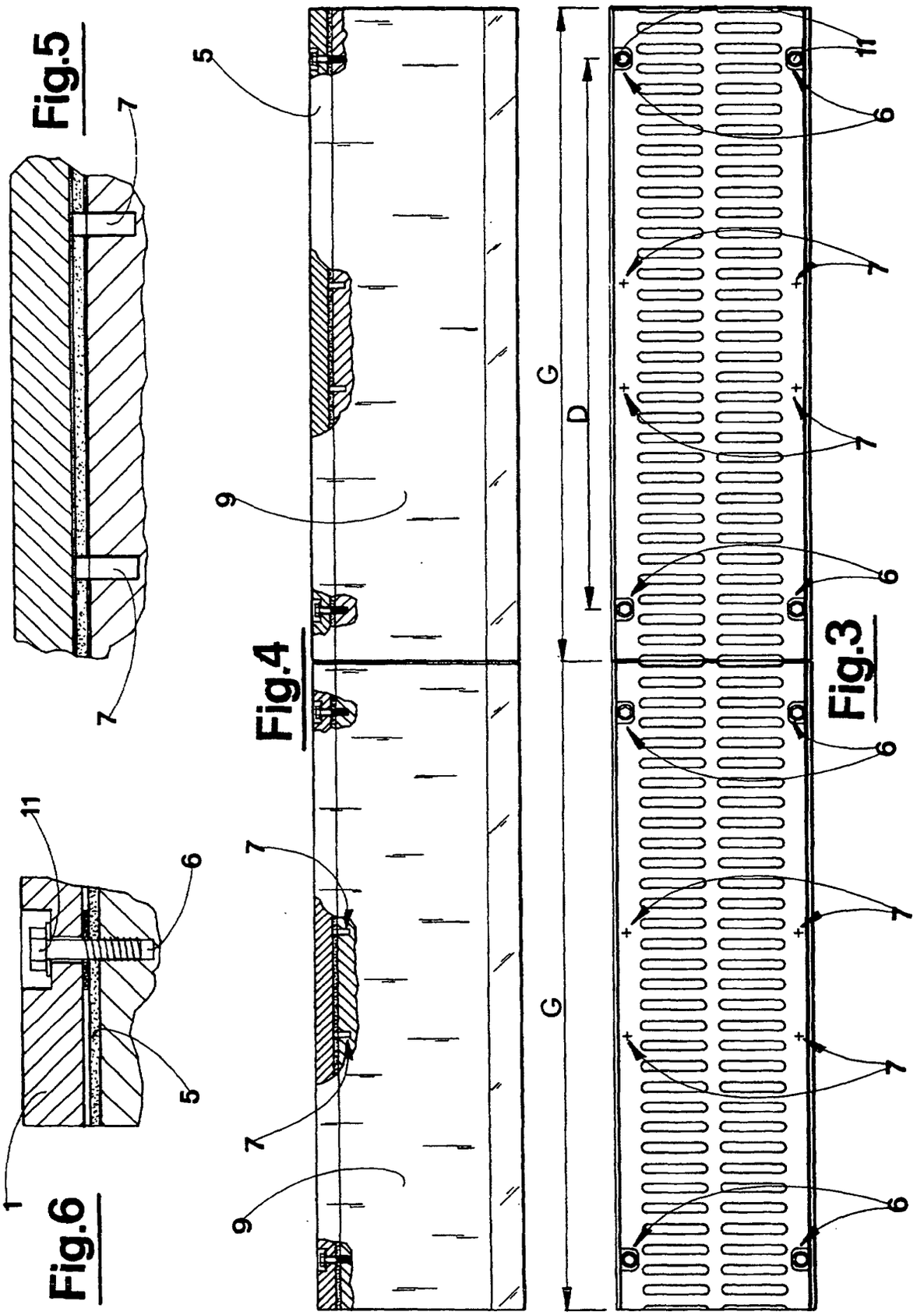
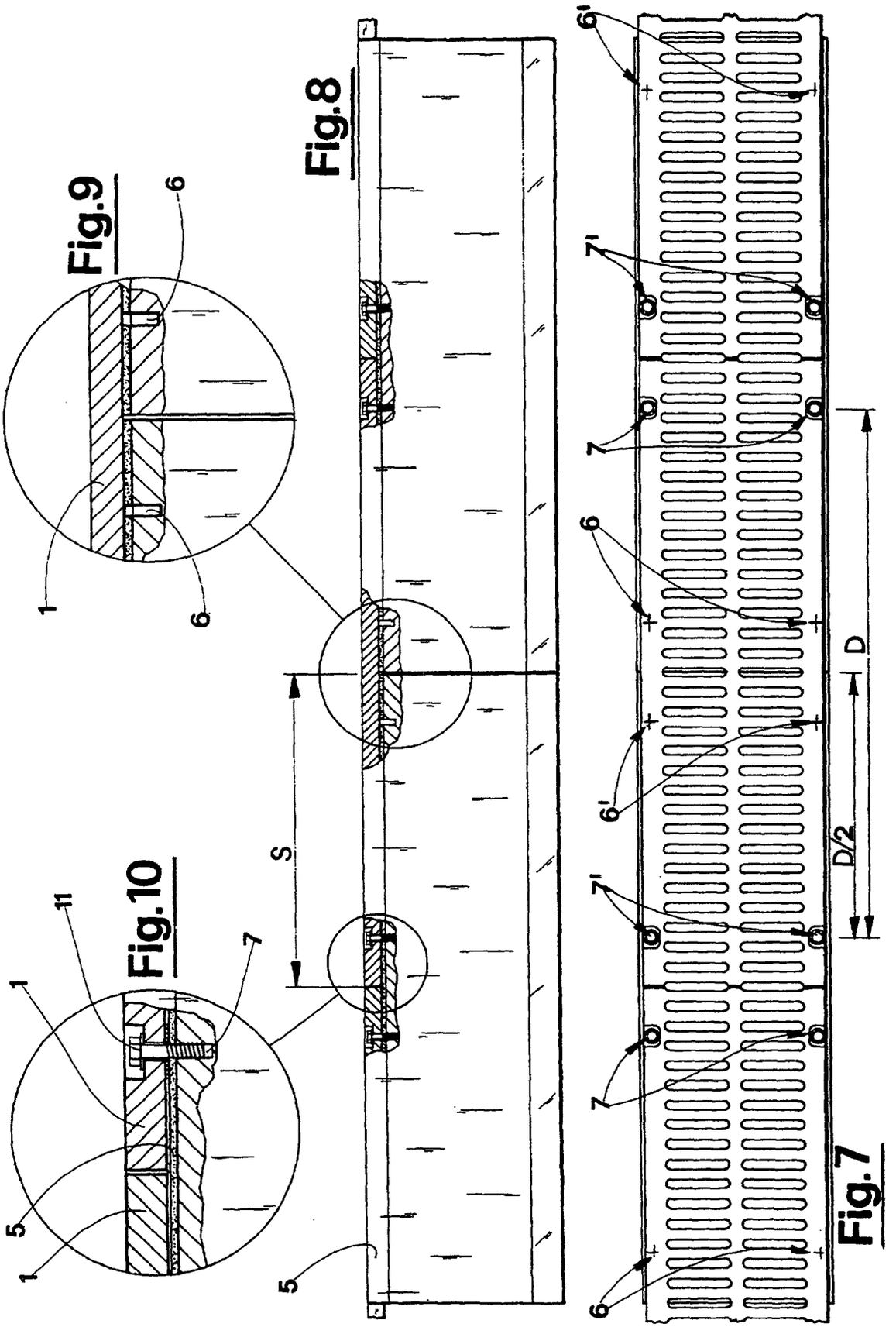


Fig.1

Fig.2


Fig.5
7
7
Fig.6
11
6
5
1
Fig.4
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9
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7
9
Fig.3
11
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6
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7
7
7
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G
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Fig.9
6
1
6
Fig.8
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Fig.10
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Fig.7

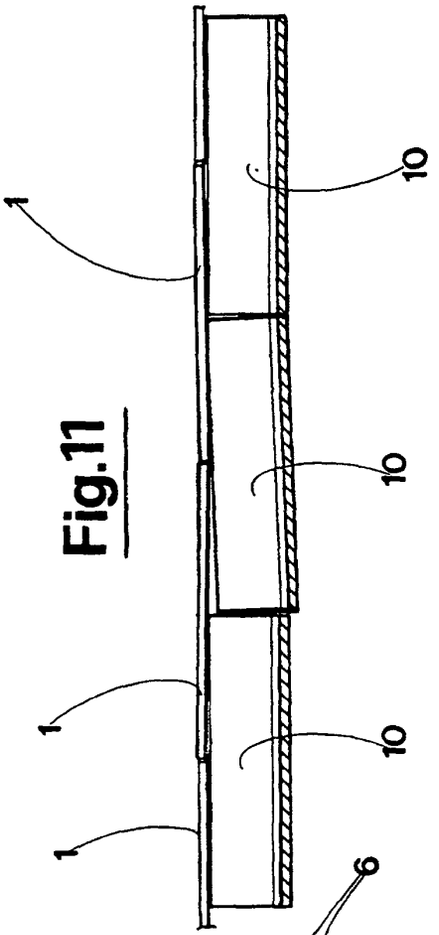


Fig.11

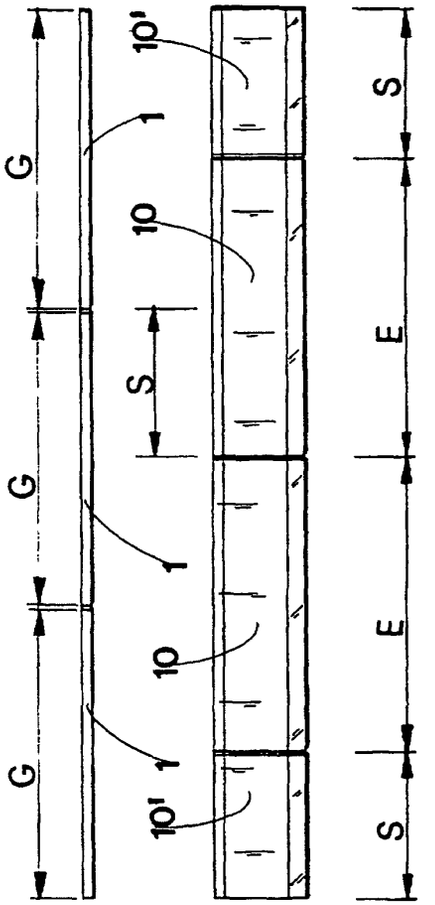


Fig.12

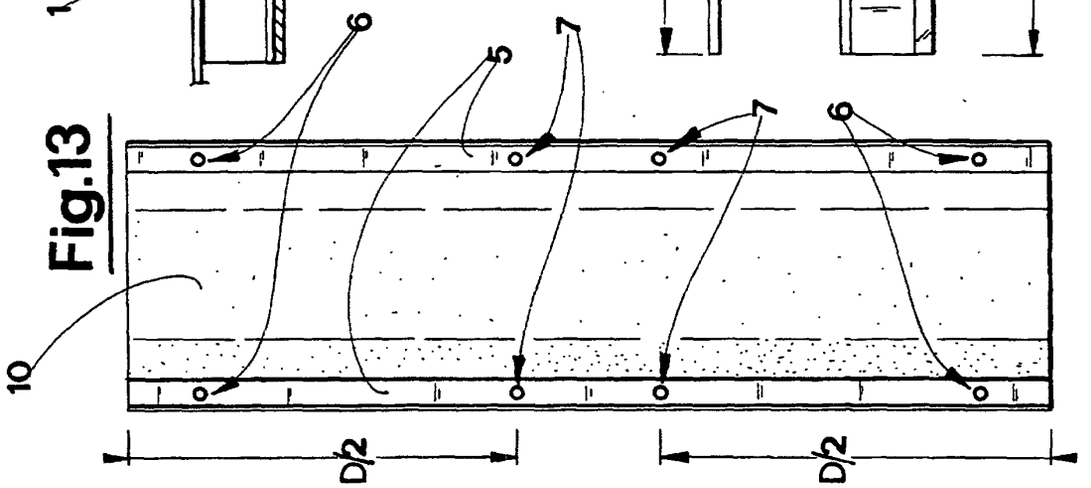


Fig.13

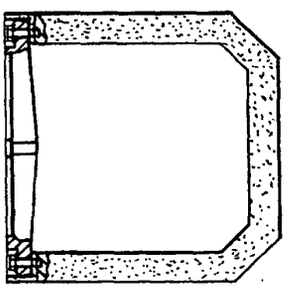


Fig.14

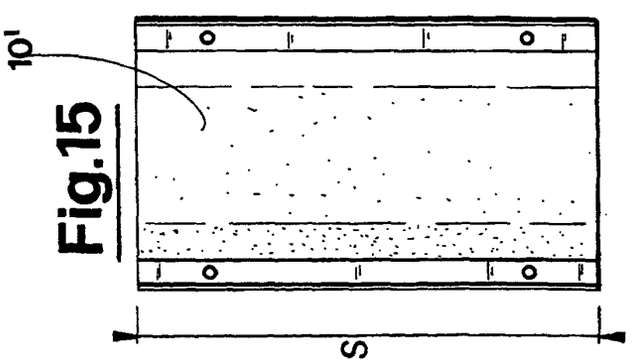


Fig.15

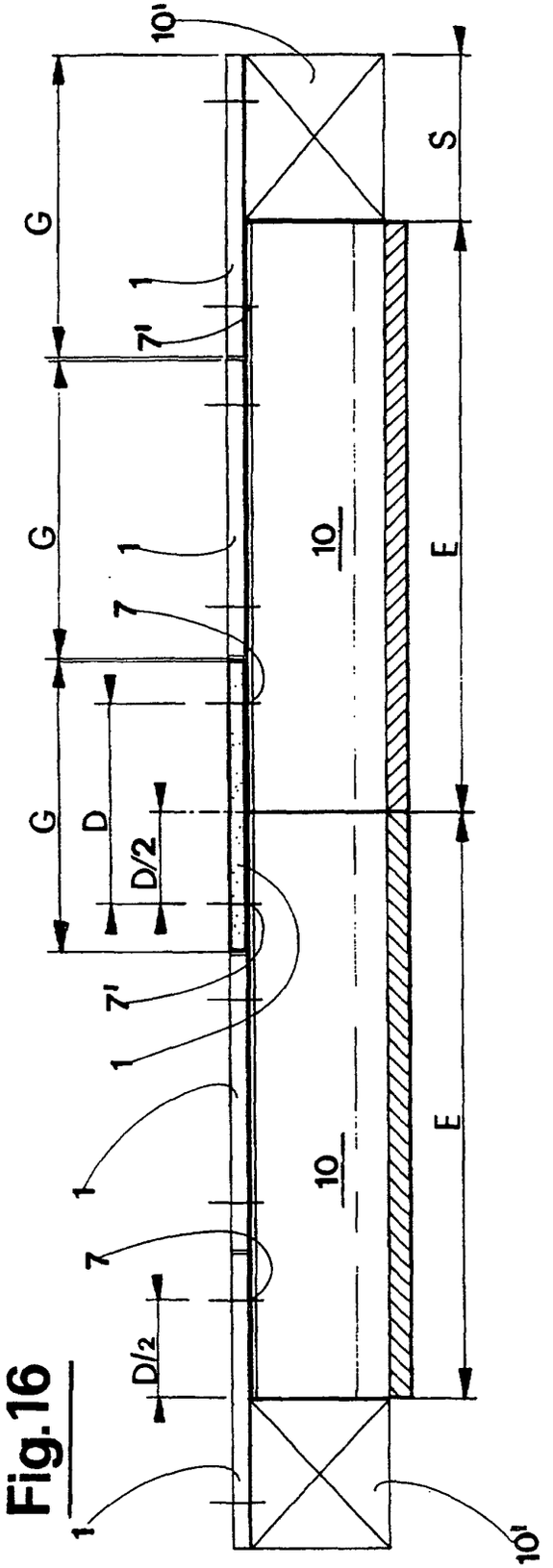

10'
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7'
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10
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Fig.16

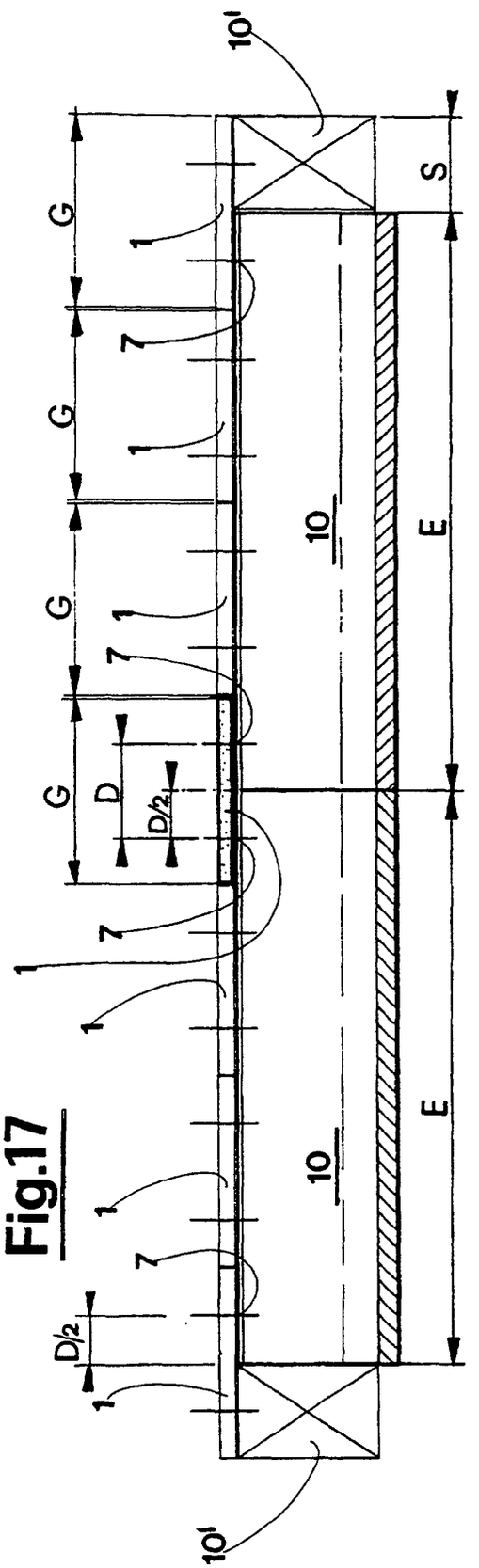

10'
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Fig.17