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(54) **Vízelvezető csatorna**

DRAINAGE CHANNEL

Description

The present invention relates to a drainage gutter, a street gulley or similar drainage gutter which can be installed in a ground, having a bottom surface and side walls which have outwardly projecting support structures which support bearing surfaces for applying a cover, more particularly a grating in a vertical direction.

By drainage gutter, street gulley or similar drainage means which can be installed in a ground are meant here all installations which serve to discharge surface water or similar water, by way of example storm water. These installations are mostly constructed so that water from an adjoining traffic surface enters into the drainage installation via a cover and is then diverted via a gutter system or downpipe. In this connection both gutters and also street gulleys, inlets and similar installations, in any possible form and configuration, are thus gathered under the above terms and more particularly under the term drainage gutter.

The above drainage gutters are known from the prior art wherein the said outwardly projecting support structures serve inter alia for supporting the bearing surfaces for the cover. More particularly in the case of drainage gutters installed in traffic surfaces it has been required hitherto to divert very high forces from the bearing surfaces down into the ground. The loads which are to be diverted naturally depend here on the use of the respective gutter. Thus a gutter which is used in areas which are not driven on has to divert very much lighter loads than a gutter which is considered by way of example for draining road bridges. These differences in loads are currently allowed for by using gutters of different dimensions which can be divided into three classes.

Thus class A applies for a gutter which is installed on a flat concrete bed and need only divert a load of 15 kN. In classes B and C gutters are used which are designed for very much higher loads. Thus a gutter of class B can divert up to 125 kN into the ground and a gutter of class C can divert up to 250 kN into the ground without causing any damage. According to the prior art structural measures are mostly undertaken here to the gutters, such as by way of example increasing the number of support structures, strengthening the gutter walls or changing the material properties in order to take into account the high load demands.

By using different gutters for different load requirements, however, increased costs are incurred both in production and in distribution which should be spared when possible. It has furthermore been shown that the gutter systems currently available on the market achieve the high load figures required in particular for classes B and C only through very expensive and more particularly material-intensive constructions. Damages to the gutters used are very often found here.

The document JP-A-10088650 discloses a drainage gutter according to the generic type.

The object of the present invention is thus to provide a drainage gutter of the type mentioned at the beginning such that it guarantees both a multi-purpose cost-effective use and manufacture and also a long-lasting operating period.

This is achieved by a drainage gutter according to claim 1.

The essence of the invention is thus that one and the same drainage gutter can achieve different load stages through the configuration of the support structures mentioned above and in dependence on the casting and/or backing with concrete. In this connection it should be mentioned that the gutter mentioned above can naturally be used not only in connection with in-situ concrete, but also with all other materials known from the prior art

for installing drainage gutters or similar drainage means and also has there its advantages according to the invention.

The general principle of the invention thus lies in configuring the support structures so that depending on the installation (embedding in concrete) different load classes arise wherein an abrupt increase when reaching the base portions by embedding is guaranteed.

By configuring the outwardly projecting support structures so that they have base portions which lie higher than the ground surface it is possible to adapt the above gutters to several different load requirements in dependence on the embedding or backing with in-situ concrete or another installation material used instead. If the gutter according to the invention is only set on a concrete bed then loads which enter into the gutter via the cover are diverted via the support structures to the bottom surface and from there into the ground. If instead of this the gutter is cast or embedded up to the base portions, then loads can be diverted into the ground both via the base portions and also via the bottom surface. This leads to a considerably improved load diversion. Thus if by way of example the gutter is installed in class C then by embedding the base portions with concrete an additional solid hold is formed for the corresponding support structure so that very much higher loads can be abruptly diverted. This hold results inter alia on the one hand in enlarged supporting regions but also on the other hand, as will be explained in further detail below, in a reduced risk of bending.

One and the same gutter can thus be adapted to different load stages in dependence on the number of base portions used. Naturally it is possible to configure not only one base portion at the support structure but also several base portions, more particularly arranged at different heights, so that different load classes can be achieved.

According to the invention the base portions are configured to be open downwards so that their walls are fixed after backing or embedding in the horizontal direction. This horizontal fixing increases to a decisive extent the load discharge capacity of the above drainage gutter. Furthermore however the downwardly opening cross-section also serves to improve the diversion of the load vertically since through the embedded or backed in-situ concrete penetrating into the downwardly open base portions the permissible compression is clearly reduced. The in-situ concrete enters into the downwardly open base portion and strengthens same, and inter alia reduces the bending length so that even with very high load figures the base portions are prevented from bending or bulging outwards.

According to the invention the base portions are configured at least in some portions as vertically extending hollow bodies with continuous walls to form a box cross-section wherein the hollow bodies more particularly have a trapezoidal cross-section. This trapezoidal cross-section is extremely advantageous particularly in the case of vertical and horizontal loads expected to be introduced at the construction site. It furthermore guarantees a very effective meshing with the embedding or backing in-situ concrete. However in addition to this "semi-hexagonal shape" other cross-sections are also possible, such as by way of example semi-circular cross-sections or polygonal cross-sections.

The configuration according to the invention of these, more particularly honeycomb-shaped or semi-hexagonal shaped, base portions thus guarantees the formation of a multi-functional drainage gutter, with low material requirements and very high load diversion capacity.

According to the invention the half of one lower edge of the base portions is configured to run as far as the bottom surface.

This means that the lower edge of the hollow body runs into the bottom surface or into the bases of the gutter so that, particularly when used in class A, it can be supported by way of these bases. When embedding the gutter in in-situ concrete this hollow body configured according to the invention can then be very easily filled with in-situ concrete or can be embedded therein.

The support structures configured as hollow bodies are preferably configured as a hollow body of trapezoidal cross-section wherein symmetrical surfaces of the trapezoidal hollow body having outer edges are pulled through to the bearing portions from the bottom to the top so that they define the outer dimensions of the gutter. In this way both forces from the bearing portions are diverted into the ground and also a torsional rigidity of the gutter is guaranteed since the symmetrical surfaces of the trapezoidal hollow body which determine the outer dimensions effectively absorb the torsional forces.

A narrow side of the trapezoidal hollow body preferably runs to the vertical from the bottom to the top in a manner inclined to the inside. Since with the above hollow body the narrow side of the trapeze pointing towards the inside of the gutter is mostly formed by the gutter body itself, this specification mostly applies to the outward facing narrow side of the trapezoidal hollow body. It guarantees that with very high loads which are diverted into the ground via the cover of the gutter it does not lead to bulging of the hollow body. Furthermore in combination with the aforementioned configuration according to the invention of the symmetrical surfaces of the trapezoidal hollow body such that they determine the outside dimensions of the gutter a support structure is formed with rear cut sections which fixes the drainage gutter after embedding or backing in particular in the horizontal direction. An improved load diversion of the base portions and hollow body is also achieved in that the hollow bodies are preferably configured to be conically tapered to the top. The bearing surfaces for supporting the cover preferably have flange portions which are arranged higher than the base portions and which are configured so that after backing and/or embedding in in-situ concrete these flange portions form additional supports for the bearing surface. It is possible in this way to guide the gutter during embedding up to the height of the flange portions up to a maximum load class. According to the invention loads can then be diverted into the ground both via the flange portions and also via the base portions and the bottom surface of the gutter.

The support structures preferably have horizontal bearing ribs running substantially parallel to the bottom surface. These bearing ribs can be arranged at the lower edge of the support structures, or however freely positioned between their respective upper edge and the lower edge and permit an effective load diversion into the ground. They are preferably formed on at least one free edge of the base portions.

According to the invention a drainage assembly is also provided with a drainage gutter according to the invention and a method for installing a drainage gutter according to the invention.

Further embodiments of the invention will be apparent from the dependent claims.

The invention will now be described below with reference to an exemplary embodiment which will be explained in further detail through the accompanying drawings. In the drawings:

Fig. 1 is an isometric view of an embodiment of the drainage gutter inclined from above;

Fig. 2 is an isometric view of the embodiment of Fig. 1 inclined from below;

Fig. 3 is a view from below of the embodiment of Fig. 1;

Fig. 4 is an isometric detailed view of the embodiment of Fig. 1 inclined from below;

Fig. 5 is a side view of the embodiment of Fig. 1 in the installed state as a class A gutter;

Fig. 6 is a side view of the embodiment of Fig. 1 in the installed state as a class B gutter;

Fig. 7 is a side view of the embodiment of Fig. 1 in the installed state as a class B gutter with an improved horizontal fixing; and

Fig. 8 is a side view of the embodiment of Fig. 1 in the installed state as a class C gutter.

In the following the same reference numerals are used for the same or similar acting components.

Figs. 1 and 2 show isometric views of an embodiment of the drainage gutter 1 according to the invention. The drainage gutter 1 comprises side walls 6 which are formed here in part as gutter bodies and serve to drain off storm water which can enter into the drainage gutter 1 via an upper region 5. Bearing surfaces 10 are provided at the upper region 5 and serve to hold a cover and more particularly a grating (not shown). At the lower region 3 the drainage gutter 1 has a bottom surface 4 which closes the drainage gutter at the bottom and furthermore provides bearing surfaces for positioning the drainage gutter 1 on a supporting bed and more particularly a concrete surface (see Figs. 5 – 8). Support structures 8 run at the lower region 3 or bottom surface 4 up to the upper region 5 of the gutter and serve to divert forces which enter into the bearing surfaces 10 and further into the drainage gutter 1 via the cover (not shown).

The support structures 8 are here configured as semi-hexagonal support structures and more particularly trapezoidal support structures. According to the invention they have base portions 12 approximately at the middle height of the drainage gutter 1, the function of which is shown in explicit detail in Figs. 5 – 8.

The support structures 8 or base portions 12 configured here according to the invention as hollow bodies, are configured open to the bottom so that after backing or embedding the drainage gutter 1 with concrete or another embedding or backing material this material penetrates into the open hollow bodies and thus enables both a vertical and horizontal fixing of the drainage gutter 1. For this at least one part of a lower edge 18 of the support structures 8 configured as hollow bodies, runs here downwards 3 to the bottom surface 4. This makes it easier inter alia for the concrete to penetrate during backing or embedding.

In order to improve the diversion of the force into the embedded or backing in-situ concrete or the material used, the base portions 12 have here bearing ribs 22 up to a free edge 14 which are configured substantially parallel to the bottom surface 4. Apart from the effective introduction of the vertical load they also allow the gutter to be fixed against the uplifting forces.

The embodiment of Figure 1 is shown in Figure 3 in a view from the underneath side 3. This shows the bottom surface 4 which merges into side walls 6. It can be seen that the support structures 8 project out from the side walls 6 and substantially define the outer contour of the gutter 1. The support structures 8 comprise the base portions 12 which are here configured as honeycomb-shaped hollow bodies which open downwards, thus in the direction of the bottom surface 4.

Fig. 4 shows the embodiment of Fig. 1 in a now detailed isometric illustration inclined from below. It can be seen that the support structures 8, which are here of honeycomb configuration, or the base portions 12 which are formed in the upper region, have trapezoidal faces wherein two symmetrical trapezoidal faces 24 and one narrow side 28 are formed. The outer edges 26 of the symmetrical

surfaces 24 are then pulled through from the bottom 3 to the top 5 so that they define the outer dimensions of the gutter 1. As opposed to this, the narrow side 28 runs inclined to the vertical (R_v) which prevents the trapezoidal support structure from bulging outwards.

The bearing surface 10 is likewise shown here on the upper edge 5 and in this embodiment has flange portions 20 which extend between the individual support portions 8 or base portions 12. The flange portions here likewise protrude outwards from the side wall 6 so that (as in Fig. 8) they serve to divert the forces where there is sufficient backing up to the flange portions 20. The inwardly inclined narrow sides 28, previously mentioned, of the trapezoidal faces are in this embodiment arranged so that they are guided under the flange portions 20 and thus experience the optimum force introduction.

A side view of the embodiment of Fig. 1 is now shown in Fig. 5, wherein the embodiment is constructed here as a class A gutter. For this the gutter 1 is set on an in-situ concrete foundation bed 30 which is provided on an earth bottom 32. The forces F, here shown as a dotted load F, which are introduced over the upper side 5 of the gutter 1 and more particularly the bearing faces 10 into the gutter 1, can thus be easily diverted via the support structures 8 to the bottom surface 4 and from there into the ground 30; 32.

The embodiment of Fig.1 is now shown in its installation form as a class B gutter in Fig. 6. Again an in-situ concrete layer 30 has likewise been applied to the earth bottom 32, but here is drawn up to a free edge 14 of the base portions 12 of the support structures 8. The base portions 12 thus lie with their bearing faces 22, formed at the free edge 14, on the in-situ concrete layer 30 so that forces which are introduced into the gutter 1 via the upper edge 5 can be diverted both via the support structures 12 and also the bottom surface 4 into the ground. In this way the load bearing capacity of one and the same gutter is decisively increased. It is further shown that the bearing ribs 22 at the free edges 14 of the base portions 12 are mounted on the in-site concrete layer 32 and thus ensure an effective load introduction.

If now, as shown in Fig. 7, the in-situ concrete layer 30 is slightly raised so that the in-situ concrete penetrates into the base portions 12 which are configured as hollow bodies, then not only is an improved load diversion achieved in the vertical direction R_v, but also a fixing of the drainage gutter 1 in the horizontal direction R_H, which is shown here diagrammatically as an orthogonal arrow to the vertical direction. It is clear that the in-situ concrete 32 was here filled in so that it just covers the bearing faces 22 of the base portions 12 and penetrates into the inner spaces of the base portions 12 shown in particular in Fig. 3. Apart from fixing in the horizontal direction R_H, this also results in a reduction in the risk of bending since by reinforcing the walls 16 of the base portions 12 their buckling coefficient is clearly reduced.

Fig. 8 now shows the configuration of the drainage gutter 1 according to the invention as a class C gutter. The in-situ concrete layer 30 is guided substantially up to the upper edge 5 of the drainage gutter 1. In more precise terms, it is here drawn up to the flange portions 20 of the bearing faces 10, which as shown in detail in Fig. 4, protrude out from the outside of the drainage gutter 1. Through the backing of the flange portions 20 loads which are introduced via the bearing faces 10 into the drainage gutter 1 are now already diverted into the ground in the upper region of the gutter. The installation

form shown in Fig. 8 thus guarantees the diversion of very high loads, since a diversion can take place evenly via the flange portions 20, the base portions 12 and the bottom surface 4.

REFERENCE NUMERAL LIST

1	Drainage gutter
3	Lower region
4	Bottom surface
5	Upper region
6	Side walls
8	Support structures
10	Bearing faces
12	Base portion
14	Free edge
16	Walls of the base portions
18	Lower edge
20	Flange portions
22	Bearing rib
24	Symmetrical faces
26	Outer edges
28	Narrow side
30	In-situ concrete
32	Earth base
R_V	Vertical direction
R_H	Horizontal direction

VÍZELVEZETŐ CSATORNA

SZABADALMI IGÉNYPONTOK

1. Vízelvezető csatorna, utcai lefolyó vagy hasonló, földbe beépíthető vízelvezető szerkezet fenék elemmel (4) és oldalfalakkal (6), amik kifelé kinyúló támasztó elemekkel (8) vannak ellátva, amik felfekvő felületeket (10) tartalmaznak egy fedél, előnyösen rács függőleges irányban (Rv) történő megtámasztására, ahol a támasztó elemek (8) legalább bizonyos csoportjai szegély szakaszokkal (12) vannak ellátva, amik magasabban, és így a felfekvő felületekhez (10) közelebb vannak elrendezve, mint a fenék elem (4), és úgy vannak kialakítva, hogy alapozó betonba (30) történő beágyazás és/vagy betonnal történő körbeöntés után ezek a szegély szakaszok (12) a felfekvő felületeknek (10) járulékos támaszt alkotnak, ahol a szegély

szakaszok (12) függőleges irányban (Rv) tekintve legalább szakaszonként üreges testet képeznek átmenő falalakkal (16) egy szekrény keresztmetszet kialakítására, és lefelé úgy nyitottak, hogy a falak (16) a beágyazás és/vagy betonnal történő körbeöntés után vízszintes irányban (Rh) rögzítve legyenek,

azzal jellemezve, hogy

a szegély szakaszok (12) alsó peremének (18) a fele a fenék elemig (4) leérően van kialakítva.

2. Az 1. igénypont szerinti vízelvezető csatorna,

azzal jellemezve, hogy

a szegély szakaszok (12) függőleges irányban (Rv) elnyúló üreges testként vannak kialakítva, és trapéz keresztmetszetűek.

3. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

a trapéz alakú üreges test szimmetrikus felületei (24) külső peremükkel (26) alulról (3) felfelé (5) át vannak vezetve a karima szakaszokon (20) oly módon, hogy meghatározzák a csatorna (1) külső méretét.

4. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

a trapéz alakú üreges test egy keskeny oldala a függőlegeshez befelé dőlve alulról (3) felfelé (5) halad.

5. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

az üreges test felfelé (5) kúposan keskenyedő alakú.

6. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

a felfekvő felületek (10) olyan perem szakaszokkal (20) vannak ellátva a fedél feltámasztására, amik magasabban vannak elrendezve, mint a szegély szakaszok (12), és amik úgy vannak kialakítva, hogy a beágyazás és/vagy betonnal történő körbeöntés után ezek a perem szakaszok (20) a felfekvő felületek (10) járulékos támasztékait képezzék.

7. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

a támasztó elemek (8) vízszintes, a fenék elemmel (4) lényegében párhuzamos ágyazó peremekkel (22) vannak ellátva.

8. Az előző igénypontok bármelyike szerinti vízelvezető csatorna,

azzal jellemezve, hogy

az ágyazó peremek (22) legalább a szegély szakaszok (12) egy szabad szélén (14) vannak kialakítva.

9. Vízelvezető csatorna elrendezés az előző igénypontok bármelyike szerinti vízelvezető csatornával, ahol a vízelvezető csatorna a talajba (32) úgy van beépítve, hogy a támasztó elemek (8) beton alapozással (30) vannak alágyazva.

10. Eljárás az 1 – 8. igénypontok bármelyike szerinti vízelvezető csatorna beépítésére a vízelvezető csatorna

- csökkentett terhelési fokozathoz csupán egy betonágyba van beállítva,
- közepes terhelési fokozathoz a szegély szakaszokig van beöntve vagy alágyazva, és
- magasabb terhelési fokozathoz felső peremig van beöntve.

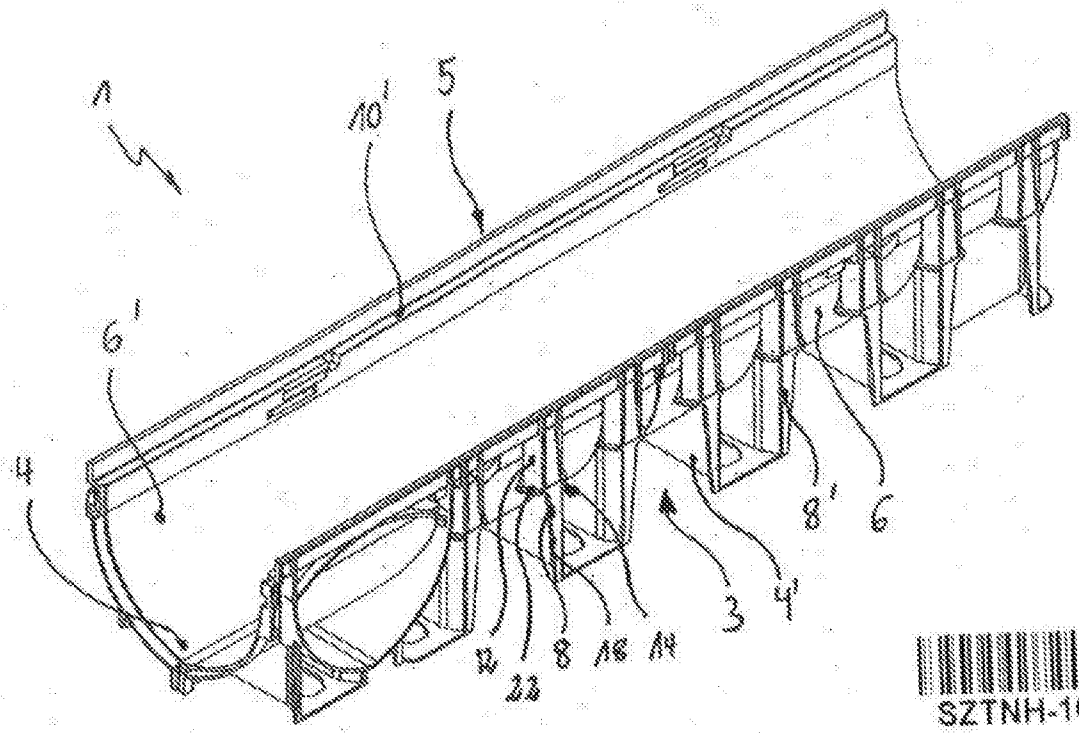

Fig. 1

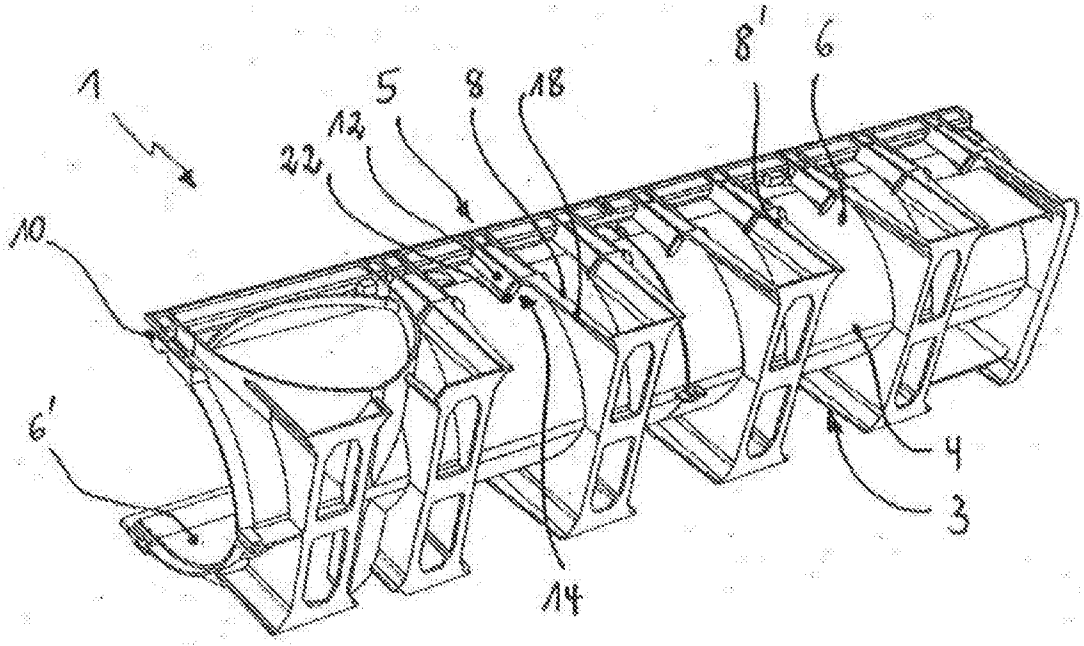

Fig. 2

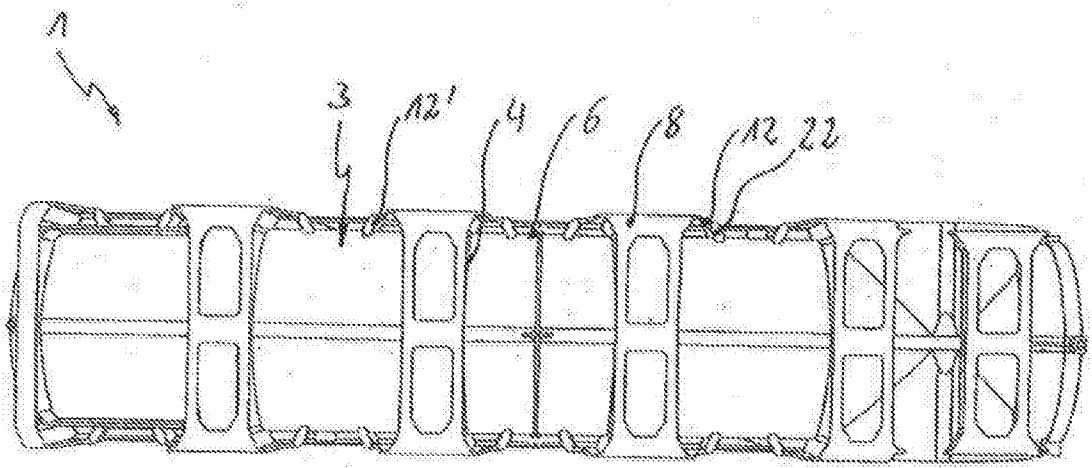

Fig. 3

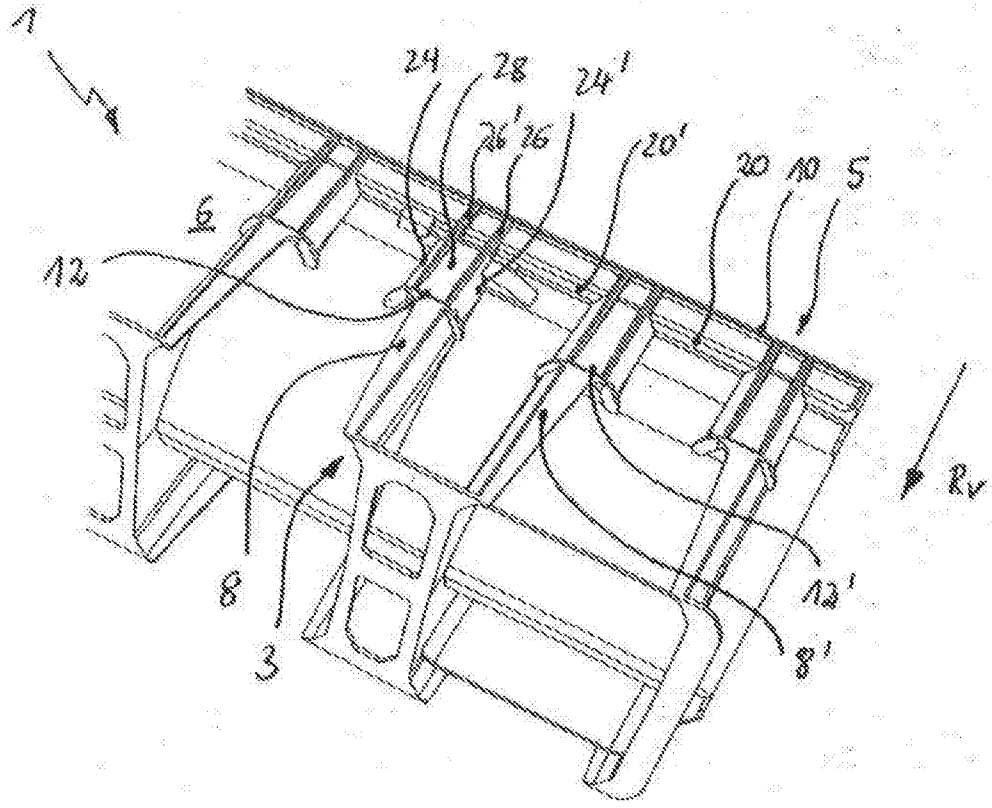

Fig. 4

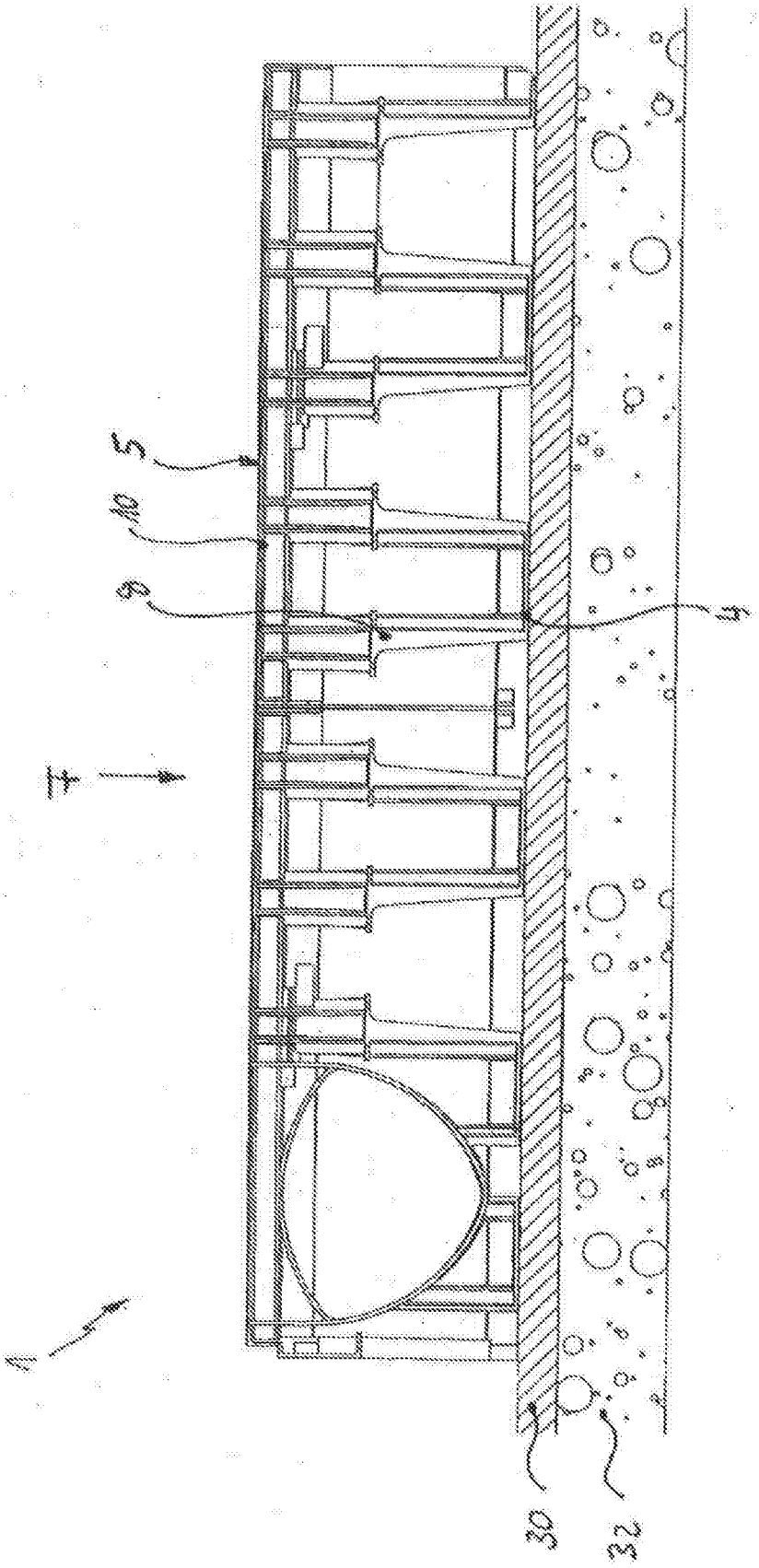

Fig. 5

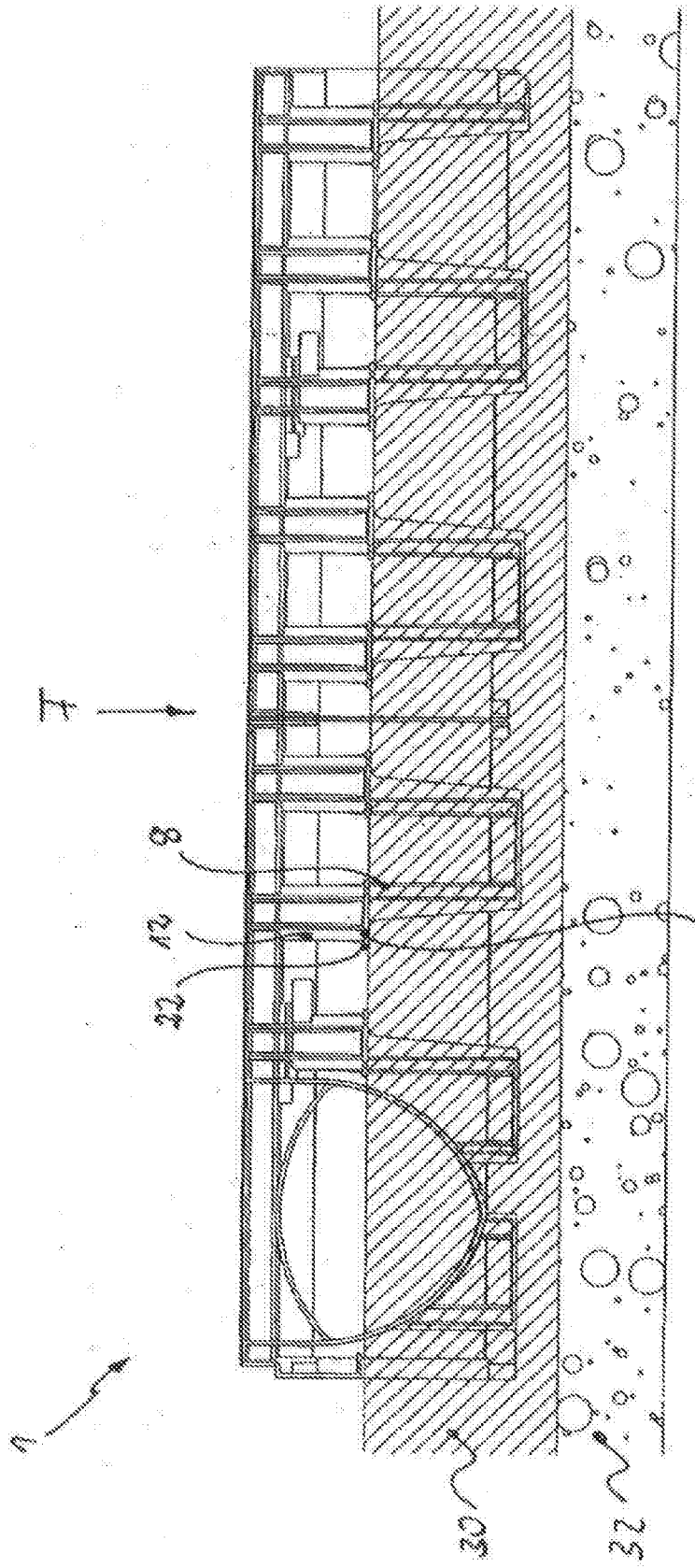

Fig. 6

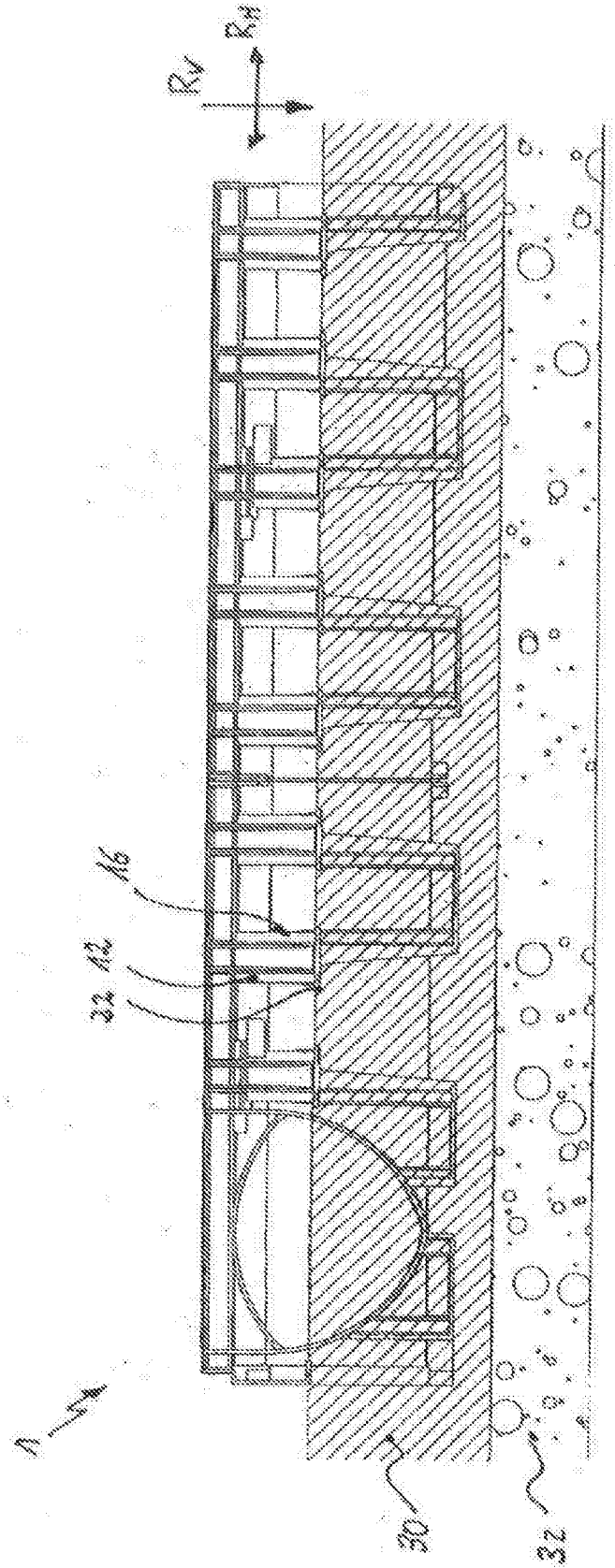

Fig. 7

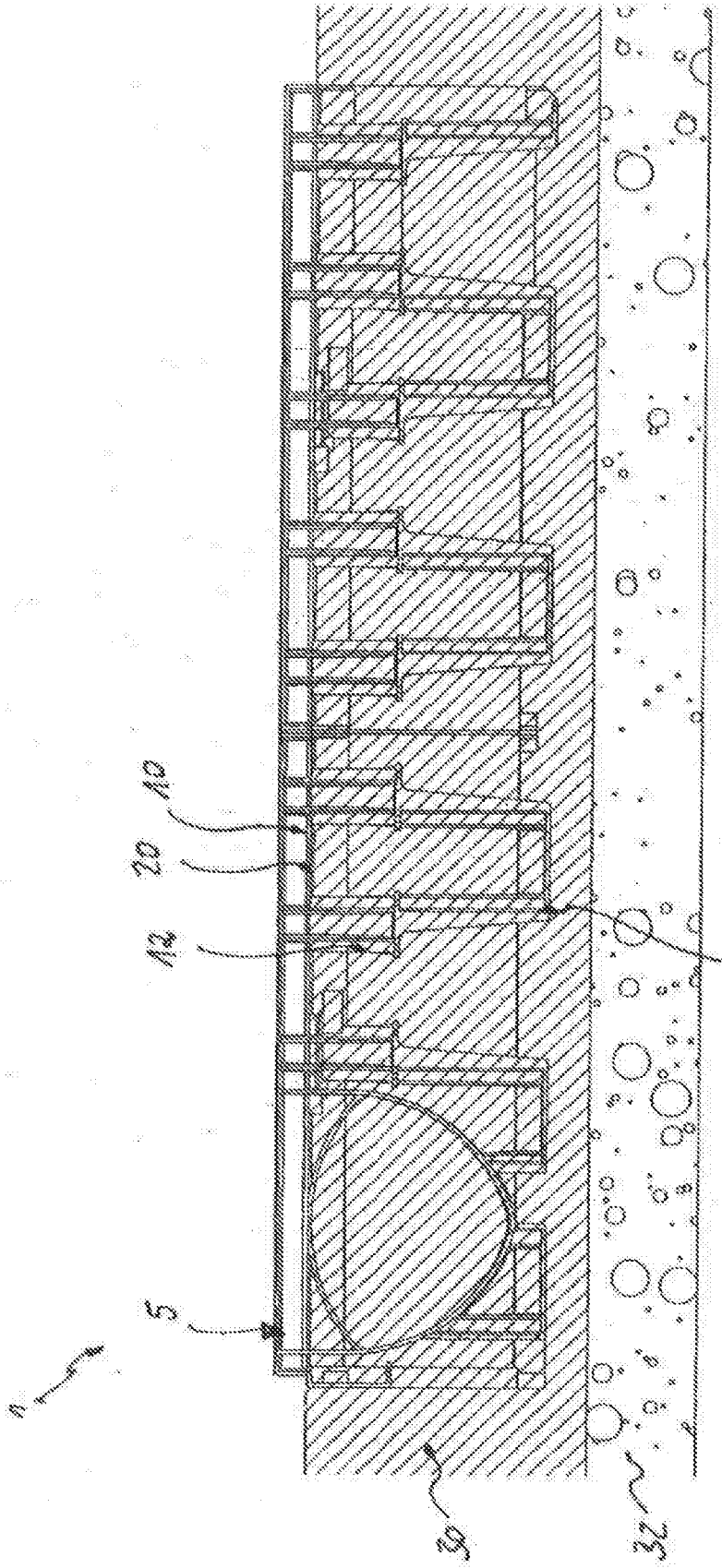

Fig. 8