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(54) **Assembly of a gutter and a grate**

(57) The present invention relates to an assembly of a gutter edge of a gutter for arranging in the ground for drainage of possibly contaminated rainwater and a grate for placing on the gutter edge, wherein the gutter edge is provided with one or more locking cavities and wherein the grate is provided with one or more protrusions which can be placed into the cavities, wherein the

grate covers the gutter in the position where the protrusions engage in the cavity, and wherein the grate is at least slightly movable in the direction of the protrusions in order to release the protrusions and the grate with the protrusions from the locking cavity.

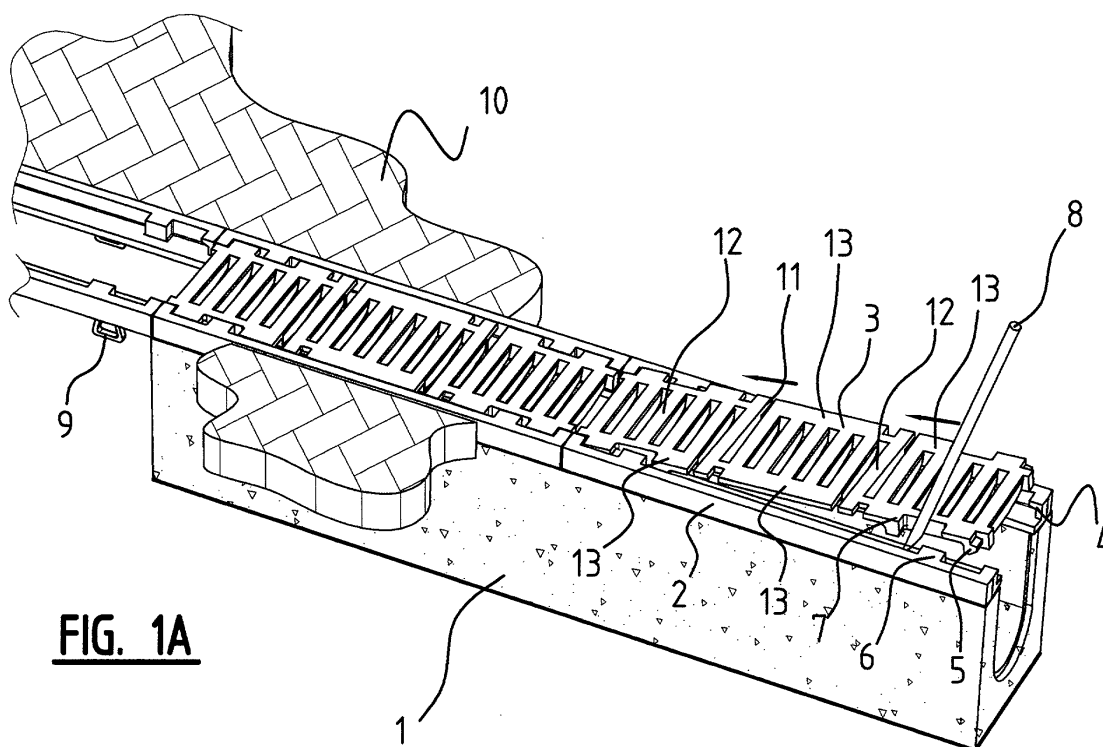


FIG. 1A

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Description

[0001] For the drainage of water, usually rainwater, with contaminants in shopping centres, airports, factory premises and the like, gutter are arranged in the ground which are covered with grates over which vehicles, such as trucks, must be able to drive. These grates are often of cast iron and fastened directly or indirectly to an edge of the gutter with bolts. In order to enable cleaning of the gutters, the bolt connection must be released, whereafter the gutters can for instance be sprayed clean.

[0002] In the recent past it has been proposed to provide such grates with a snap connection of sheet steel so that the time-consuming manual operation of releasing the screw bolts can be dispensed with. This sheet steel snap connection has insufficient durability and inadequate locking because the force in opening and closing direction is almost the same. A very good locking is essential for use on the public highway.

[0003] The present invention has for its object to obviate the above stated problems and provides an assembly of a gutter edge with a gutter for arranging in the ground for drainage of possibly contaminated rainwater and a grate for placing on the gutter edge, wherein the gutter edge is provided with one or more locking cavities and wherein the grate is provided with one or more protrusions which can be placed into the cavities, wherein the grate closes the cavity in the position where the protrusions engage in the cavity, and wherein the grate is at least slightly movable in the direction of the protrusions in order to release the protrusions and the grate from the locking cavity.

[0004] In a first preferred embodiment the grate is of cast iron, which material is sufficiently wear-resistant and strong and which is moreover sufficiently resilient to enable the above stated movement of the protrusions.

[0005] In a further preferred embodiment the grate is elongate and comprises a number of transverse and longitudinal ribs, wherein the above stated movement of the protrusions is obtained by interrupting one or more longitudinal ribs. This preferred embodiment has the further advantage that it can be readily manufactured from cast iron and sufficiently ensures the strength.

[0006] The assembly of the present invention further has one or more cams, for instance four, on both the edge and on the grate, so that the movement of the protrusions can be readily obtained with a lever such as a crowbar which then engages on said cams.

[0007] In a further preferred embodiment the gutter edge is likewise of cast iron with the above stated advantages of this material, in particular wear-resistance and strength, while in preference the gutter edge is fixed and cast in concrete in the factory, for instance by means of anchoring eyes cast together with the gutter edge.

[0008] A further advantage is that the grate cannot be detached spontaneously by traffic or other forces because the grate can only be released intentionally via

the resilient action.

[0009] In a further preferred embodiment the grate is arranged in the locked situation under bias in the edge, thus preventing rattling of the grate.

[0010] In a further preferred embodiment the gutter has a droplet-shaped profile. Relatively small quantities of rainwater are thereby drained more quickly due to a higher flow speed than in a rounded gutter, so that contamination is also flushed away quickly and less maintenance is required.

[0011] According to another aspect the invention provides a method for manufacturing an assembly of a grate, gutter edge and gutter substantially as described above, comprising the steps of:

- manufacturing an edge of cast iron with a non-core casting process and anchoring thereof in the concrete of a gutter;
- manufacturing a grate which is elongate and comprises a number of transverse and longitudinal ribs, wherein one or more longitudinal ribs are interrupted in longitudinal direction for the purpose of resilient embodiment thereof;
- arranging a grate in the edge by making it shorter in resilient manner.

[0012] Using such a method the assembly can be manufactured in the factory and assembled so that transport becomes simpler and arrangement in a road surface costs less time. The non-core casting process for the edge also saves a manufacturing step, since the cams on the edge and the holes in the anchors are already created during casting and do not have to be milled or drilled afterward.

[0013] In a preferred embodiment the grate is of spherical-graphite cast iron and the gutter edge of gray cast iron. The cast iron of the edge is strong, whereby the edge takes up the forces caused by biasing of the grate and the concrete of the gutter is not under strain of (tensile) force.

[0014] Further advantages, features and details of the present invention will be elucidated on the basis of the following description of a preferred embodiment thereof with reference to the annexed drawings, in which:

- figure 1A shows a partly broken-away view in perspective of a preferred embodiment of an assembly according to the present invention in a first position of use;
- figure 1B shows a partly broken-away view in perspective of the preferred embodiment of figure 1A in a second position of use;
- figure 2A is a partly broken-away view in perspective of a preferred embodiment of a grate in a first position for use in the assembly shown in 1; and
- figure 2B shows the grate depicted in figure 2A in a second position where it is made shorter;
- figure 3 is a side view of a cross-section of an as-

sembly of gutter, grate and edge in a second preferred embodiment.

[0015] A preferred embodiment of an assembly (figures 1A and 1B) comprises a gutter 1 with an edge 2 and a grate 3 (see also figures 2A and 2B). Such an assembly is placed for instance in the road surface 10 in a shopping centre for the purpose of draining water possibly provided with contamination such as leaves, sand and the like. The assembly must in practice be able to withstand road traffic of a minimum of traffic class C250. Gutter 1 is preferably manufactured from concrete, while edge 2 is fixed therein with anchors 9 during curing of the concrete, which preferably takes place in the factory. For reasons of durability and strength, the gutter edge 2 is preferably manufactured from cast iron.

[0016] Two mutually opposite gutter edges 2 are together provided with four cavities 4 and four inward pointing cams 6.

[0017] The preferred embodiment shown in figures 1 and 2 of a grate fitting onto the edge 2 comprises for instance about fifteen transverse ribs 12 which are mutually connected via longitudinal ribs 13. The grate is further provided with four protrusions 5 which engage in cavities 4 in the position closing the gutter.

[0018] Longitudinal ribs 13 are interrupted at two positions on each of the two sides. The grate is preferably manufactured from spherical-graphite cast iron which, in addition to being durable and strong, can also exhibit a determined resilience, for instance up to 17% elongation/compression.

[0019] Owing to the interruptions and/or the material used and the design of the grate and the edge, using a tool 8, for instance a crowbar-like element, the grate can be compressed on one of the two sides in each case between a cam 6 and cam 7, so that the protrusions 5 are urged out of the locking cavities 4 and the grate can easily be lifted integrally and the gutter below can be cleaned, wherein use can also be made of a sprayer for spraying clean the gutter with force under other grates, see in particular figure 1A. Figure 1B shows the corresponding manner in which the grate can be placed.

[0020] In the above described preferred embodiment of the assembly according to the present invention wear is avoided, since in the position covering the gutter the grate lies free of tension on the gutter edge. Material fatigue and wear of the cast iron is thereby prevented.

[0021] In a second preferred embodiment the profile 15 of gutter 2 is embodied in the shape of a droplet (figure 3). A relatively small quantity of rainwater is drained more rapidly due to a higher flow speed than in a rounded gutter; contamination is likewise flushed away rapidly. Maintenance costs are hereby reduced.

[0022] The gutter according to the first or the second embodiment is provided with a cast-iron edge which is strong and suitable for use in road and hydraulic engineering. This edge is preferably cast using a so-called non-core casting process, see for instance the European

patent 0 454 258. The eyes 9 and cavities 4 (figure 1) are preferably manufactured directly during casting in order to avoid the cast iron having to be further processed after casting. The edge is of cast iron, whereby the bias of the grate in length direction is taken up by this edge and the concrete of gutter 2 is not under strain of (tensile) force. The assembly can therefore be transported from the factory in the assembled state. In the locked situation the grate 3 is preferably under some bias in length direction in the edges to prevent rattling thereof.

[0023] The present invention is not limited to the above described preferred embodiments thereof; the rights sought are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Assembly of a gutter edge of a gutter for arranging in the ground for drainage of possibly contaminated rainwater and a grate for placing on the gutter edge, wherein the gutter edge is provided with one or more locking cavities and wherein the grate is provided with one or more protrusions which can be placed into the cavities, wherein the grate covers the gutter in the position where the protrusions engage in the cavity, and wherein the grate is at least slightly movable in the direction of the protrusions in order to release the protrusions and the grate with the protrusions from the locking cavity.
2. Assembly as claimed in claim 1, wherein the grate is of cast iron.
3. Assembly as claimed in claim 1 or 2, wherein the grate is elongate and comprises a number of transverse and longitudinal ribs, wherein one or more longitudinal ribs are interrupted in longitudinal direction for the purpose of resilient embodiment thereof.
4. Assembly as claimed in any of the foregoing claims, wherein the edge is provided with one or more cams on which a tool can engage in co-action with one or more cams on the grate in order to release the protrusions from the locking cavity with a tool.
5. Assembly as claimed in any of the foregoing claims, wherein the gutter edge is of cast iron.
6. Assembly as claimed in any of the foregoing claims, wherein the gutter is of concrete and the gutter edge is at least partially embedded in the concrete of the gutter.
7. Assembly as claimed in claim 6, wherein the grate is arranged in the locked situation under bias in the

edge.

8. Assembly as claimed in any of the foregoing claims, wherein the gutter has a droplet-shaped profile.

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9. Grate substantially as according to the description and/or figures and/or evidently suitable for the assembly as claimed in one or more of the foregoing claims.

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10. Method for lifting and/or placing a grate and/or assembly substantially as according to the foregoing claims and/or foregoing description with reference to the annexed drawings.

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11. Method for manufacturing an assembly of a grate, gutter edge and gutter substantially as claimed in any of the foregoing claims, comprising the steps of:

- manufacturing an edge of cast iron with a non-core casting process and anchoring thereof in the concrete of a gutter; 20
- manufacturing a grate which is elongate and comprises a number of transverse and longitudinal ribs, wherein one or more longitudinal ribs are interrupted in longitudinal direction for the purpose of resilient embodiment thereof; 25
- arranging a grate in the edge by making it shorter in resilient manner. 30

12. Method as claimed in claim 11, wherein the grate is of spherical-graphite cast iron and wherein the gutter edge is of gray cast iron.

13. Method for transporting an assembly of grate, gutter edge and gutter as claimed in any of the foregoing claims, wherein the grate is arranged under bias in the gutter edge. 35

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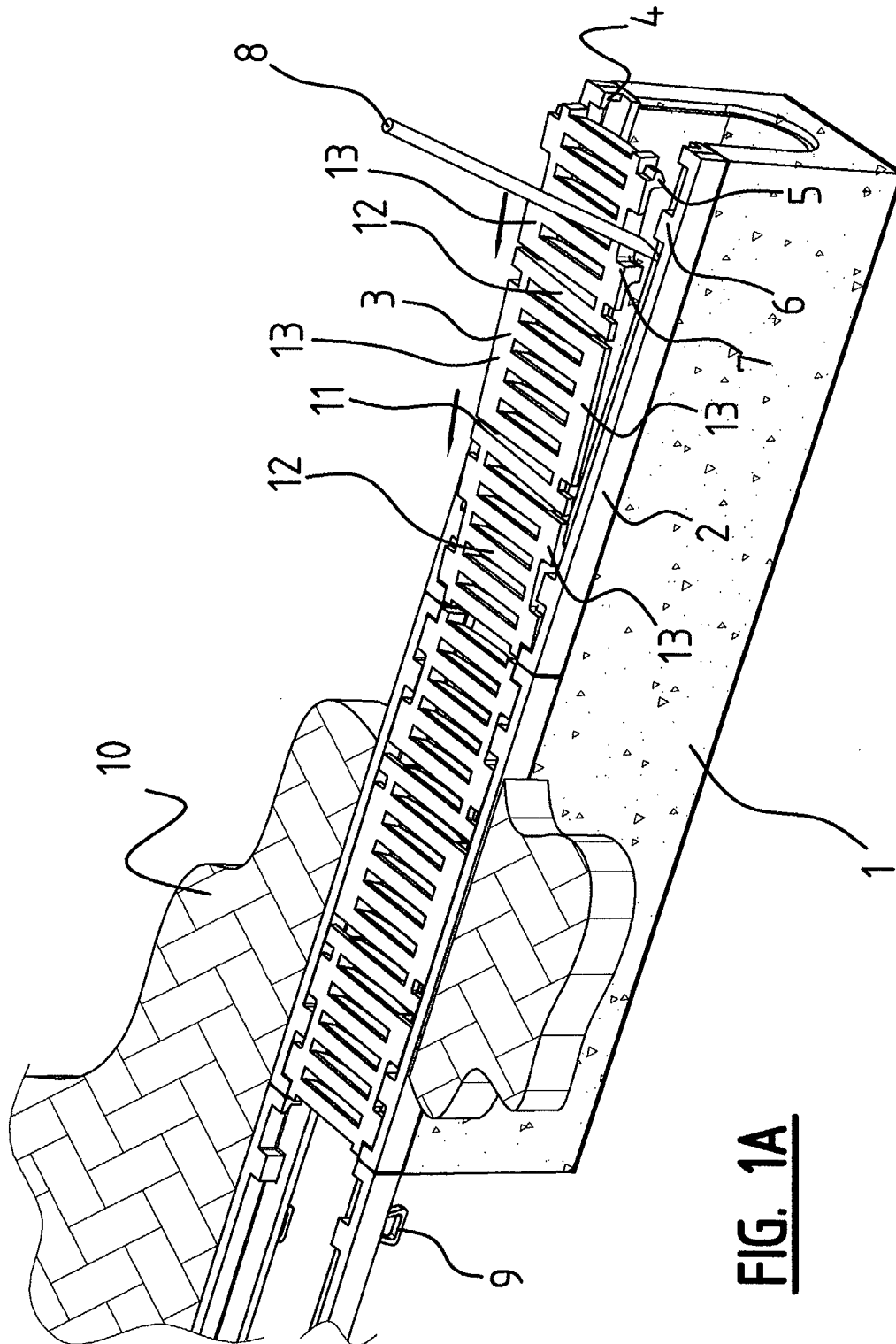


FIG. 1A

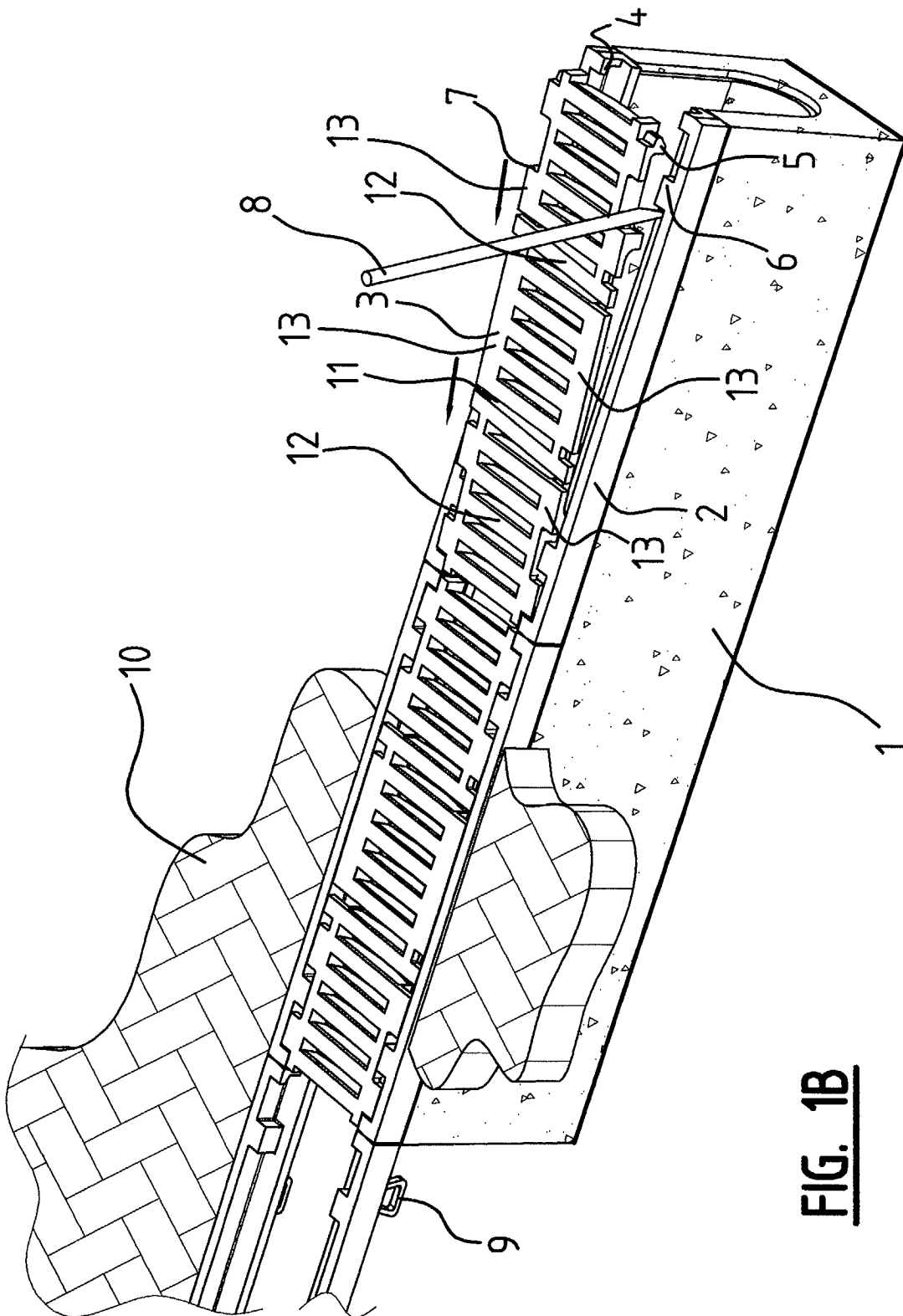


FIG. 1B

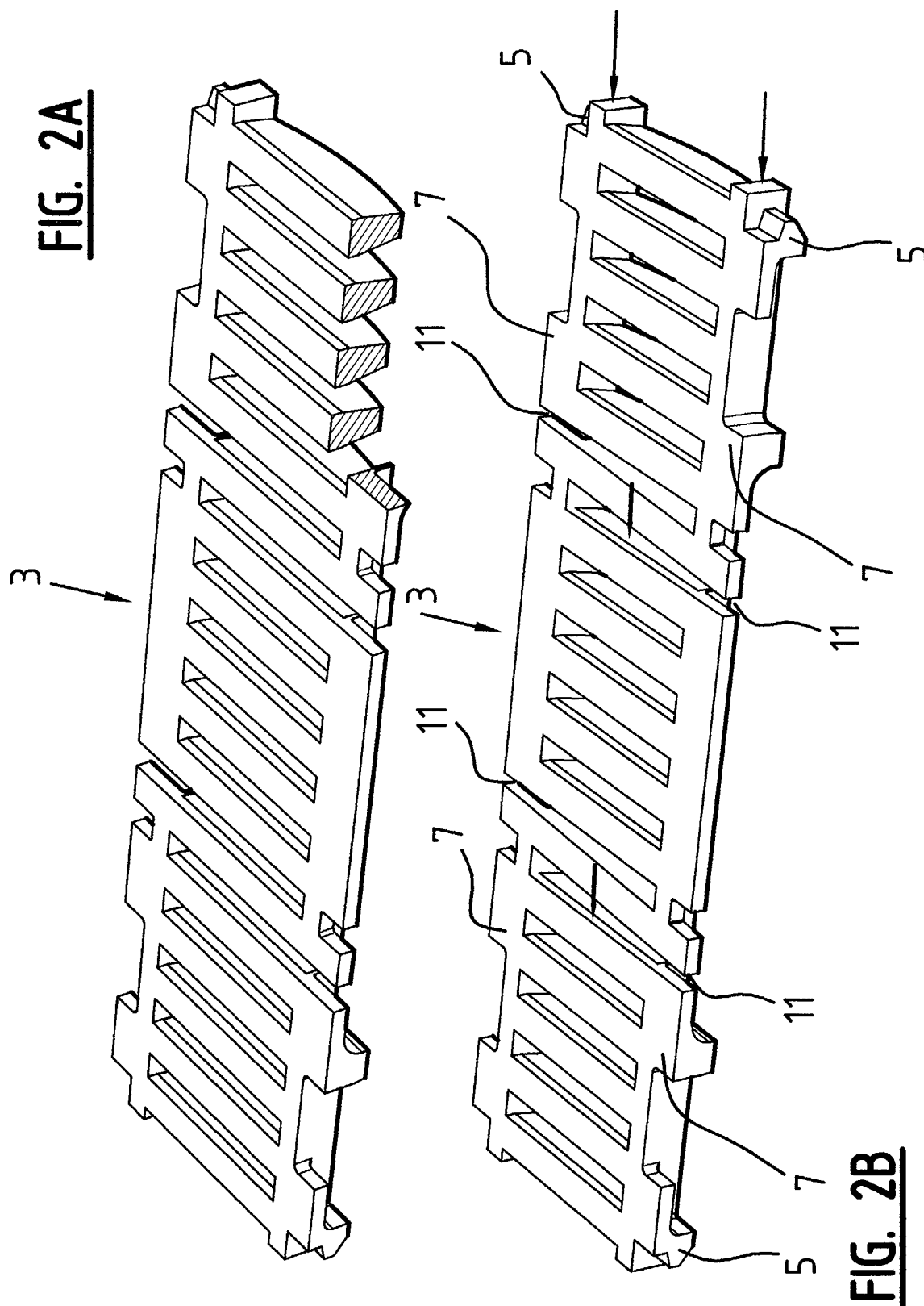


FIG. 2A

FIG. 2B

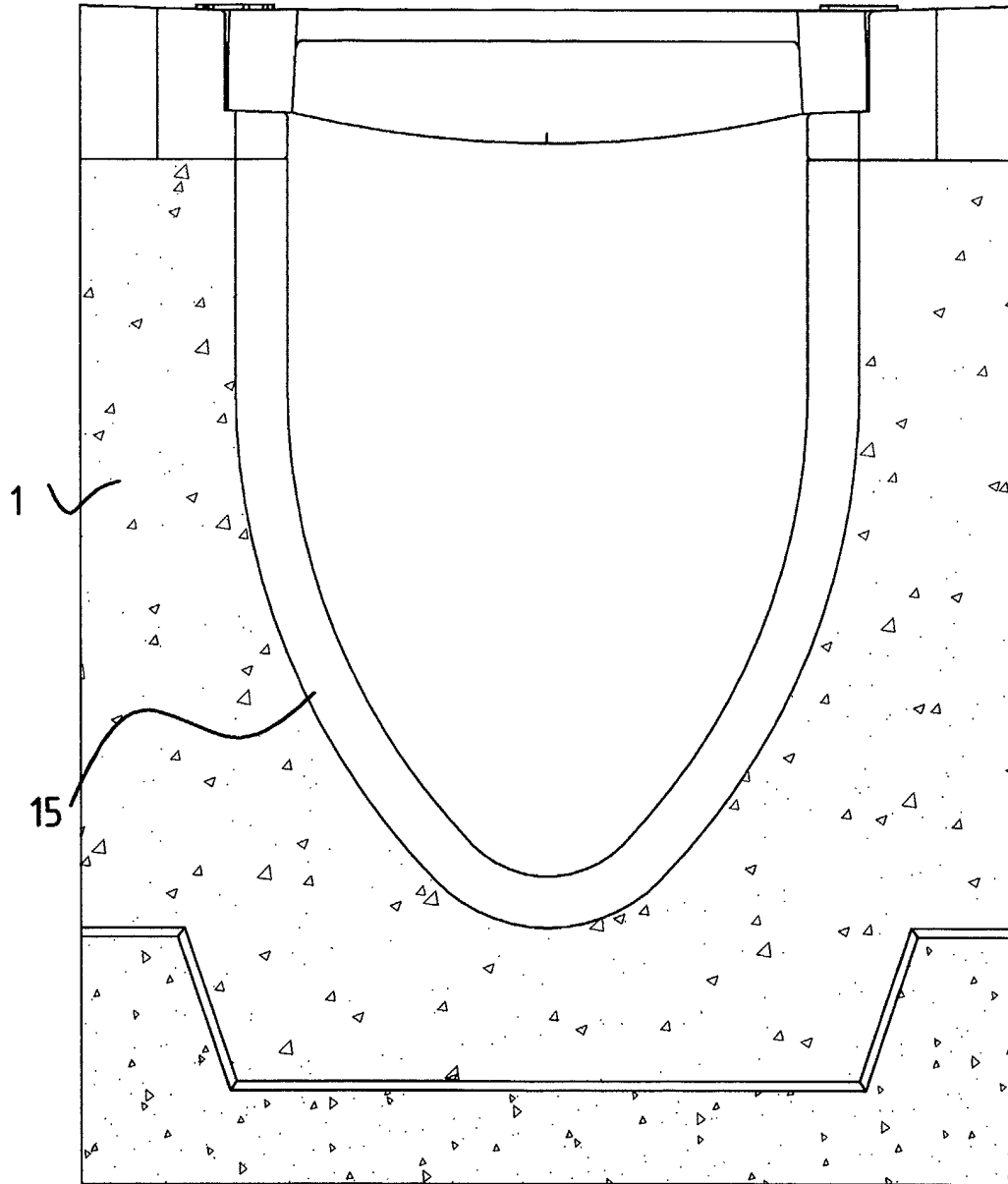


FIG. 3