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(54) **Cover plate for a road hole**

(57) A cover plate for covering a hole of a road, the cover plate comprising several elongated metal profiles 2 arranged side by side, each metal profile having opposite side walls, the adjacent side walls of adjacent metal profiles abutting on each other. The metal profiles have been attached to each other along the long sides thereof, the metal profiles thereby forming a plate shaped entity 3 having a bottom surface and a top surface. The cover plate further comprises elongated wedge shaped end pieces 4 attached at opposite ends of the plate shaped entity, extending perpendicularly to the metal profiles, covering the ends of the metal profiles, and each having a sloping top surface. Thus, the cover plate is arranged to be placed with the metal profiles extending along a driving direction of the road.

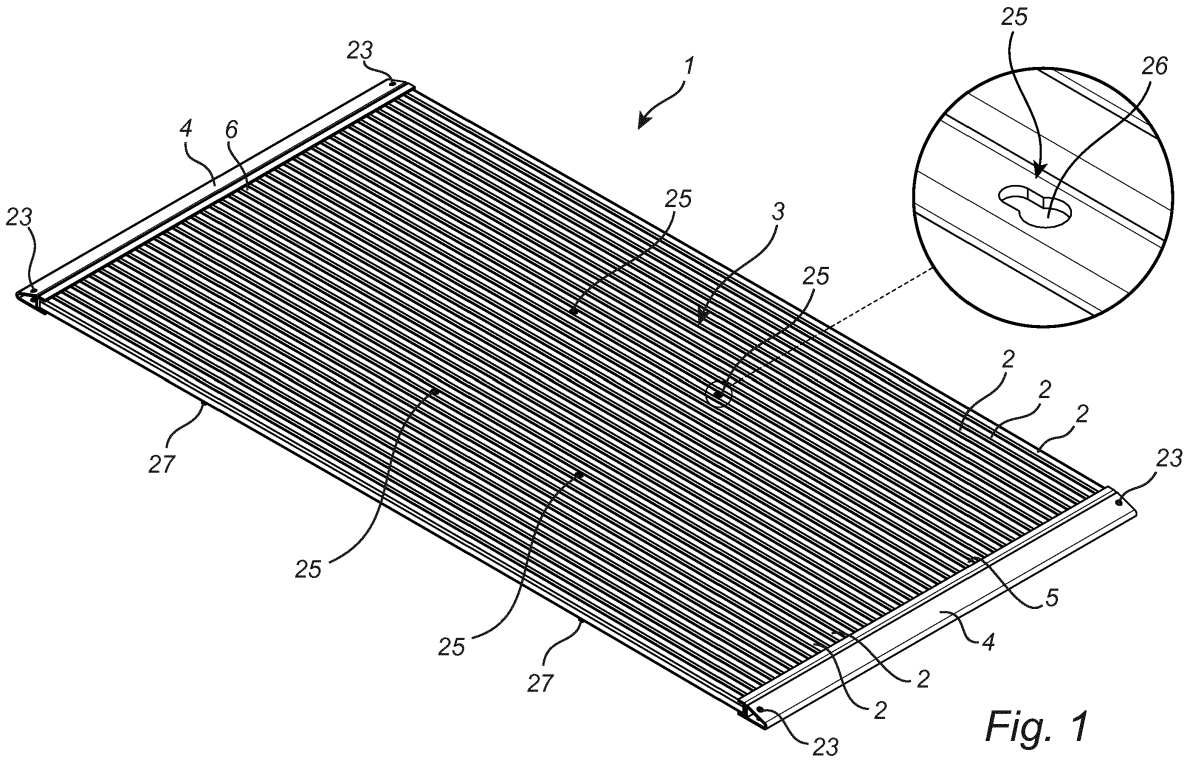

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of cover plates for covering a hole in a road.

BACKGROUND OF THE INVENTION

[0002] When a hole is dug in a road in order to do some ground work, lay down a pipe, etc., a cover plate is placed to cover the hole, in order to allow vehicles to pass. Conventional cover plates are simply made of a solid steel plate having a typical thickness of 30-50 mm and a size of several square meters. Such conventional cover plates are heavy and require a large amount of material to manufacture, and causes a high energy consumption for transporting them.

[0003] An effort to reduce the weight of the cover plate has been made as disclosed in DE 10215110. Basically DE 10215110 discloses a soft ground plate, wherein several soft ground plates are interconnected to form a road surface on top of soft ground. However, one embodiment is shown where the soft ground plate is used as a cover plate for covering a hole of a road. More particularly, DE 10215110 discloses a cover plate with several elongated open profiles each having a flat top portion and sloping side walls, which profiles are placed side by side, and are interconnected by means of opposite side angle steels connected to the respective ends of the profiles. The profiles extend transversally, with regard to a driving direction of a passing vehicle, i.e. the angle steels are arranged along the sides of the cover plate. Several cover plates are consecutively placed and are interconnected, by connecting their angle steels with each other, to form a road surface on soft ground. In one example disclosed in DE 10215110 the cover plates are used to cover a hole in the ground, and then a bottom portion is welded to each profile to cover the opening of the profile, and top stripes are welded between the top portions of the profiles, all in order to increase the bending strength and torsion strength to allow the cover plate to be used for covering a hole. This use of profiles decreases the weight of the cover plate relative to the solid steel plate for carrying a corresponding load of a passing vehicle. However, this prior art cover plate is cumbersome to manufacture.

SUMMARY OF THE INVENTION

[0004] It would be advantageous to provide a solution which simplifies the manufacture of the cover plate.

[0005] To better address this concern, in a first aspect of the invention there is presented a cover plate for covering a hole of a road, the cover plate comprising several elongated metal profiles arranged side by side, each metal profile having opposite side walls, the adjacent side walls of adjacent metal profiles abutting on each other. The metal profiles have been attached to each other along the long sides thereof, the metal profiles thereby forming a plate shaped entity having a bottom surface and a top surface. The cover plate further comprises elongated wedge shaped end pieces attached at opposite ends of the plate shaped entity, extending perpendicularly to the metal profiles, covering the ends of the metal profiles, and each having a sloping top surface. The cover plate is thereby arranged to be placed with the metal profiles extending along a driving direction of the road.

[0006] By using metal profiles which can be arranged to form the cover plate with bottom and top surfaces, and which are easily attached to each other, the cover plate is more comfortably manufacturable than the prior art cover plate. By arranging the metal profiles longitudinally instead of transversally the bending resistance of the cover plate can be accurately pre-calculated. Furthermore, since typically the size of the cover plate along the driving direction exceeds the size perpendicular thereto, the assembly of the cover plate from separate metal profiles less time consuming than if they were mounted transversally of the driving direction. Additionally, the end pieces provide ramps facilitating driving onto the cover plate with a vehicle, in particular on hard ground surfaces, such as asphalt.

[0007] In accordance with an embodiment of the cover plate the metal profiles are arc shaped in their longitudinal direction. Thereby the cover plate is vault shaped and has a further increased strength. As understood by the person skilled in the art, the metal profiles are only bent to a minor extent.

[0008] In accordance with an embodiment of the cover plate the metal profiles have been attached to each other by welded portions, where the welded portions are lengthwise intermittently situated alternately at upper edges and lower edges of the metal profiles. This embodiment has an advantageous attachment between the profiles, which attachment is simple and strong.

[0009] In accordance with an embodiment of the cover plate the metal profiles have rectangular cross sections. The rectangular cross-section facilitates the manufacture of the cover plate, where the profiles can simply be placed side by side and attached to each other.

[0010] In accordance with an embodiment of the cover plate each ramp comprises a U-shaped portion extending along the edge of the plate shaped entity embracing an end portion thereof, and a wedge portion protruding from the U-shaped portion and having an upper surface sloping downwards away from the U-shaped portion. The U-shaped portion provides a lid covering the open ends of the profiles, thereby preventing them from being filled with dirt.

[0011] In accordance with an embodiment of the cover plate each ramp comprises at least one road anchoring portion comprising an aperture providing vertical passage for a road anchoring element. Thereby it is ensured that the cover plate can be kept in place by being anchored to the ground.

[0012] In accordance with an embodiment of the cover plate it comprises two strip shaped elements extending laterally of the plate shaped entity at a bottom side thereof and being attached to the plate shaped entity at a distance from each other. The strip shaped elements mark a boarder of a minimum portion of the cover plate, at each respective end thereof, which has to rest on the ground. This embodiment has an increased security in use, since it is easy for a user to properly place the cover plate at the hole.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will now be described in more detail and with reference to the appended drawings in which:

Fig. 1 is a perspective view from above of an embodiment of the cover plate according to the present invention;
Fig. 2 is a perspective view from below of the cover plate shown in Fig. 1;
Fig. 3 is a partly cross-sectional and perspective view of a part of the cover plate shown in Fig. 1;
Fig. 4 is a perspective view of a part of the cover plate of Fig. 1;
Figs. 5a and 5b are schematic illustrations of attachment principles;
Fig. 6 is a partly cross-sectional and perspective view of a part of another embodiment of the cover plate according to the present invention; and
Fig. 7 is a side view of another embodiment of the cover plate.

DESCRIPTION OF EMBODIMENTS

[0014] In a first embodiment the cover plate 1 comprises several elongated metal profiles 2, which are arranged side by side and form a plate shaped entity 3, and elongated wedge shaped end pieces 4 attached at opposite ends 5, 6 of the plate shaped entity 3. Each metal profile 2 has opposite side walls 7, 8; 7', 8'; 7", 8". The metal profiles 2 are placed such that the adjacent side walls 8, 7'; 8', 7", of adjacent metal profiles abut on each other, wherein the metal profiles 2 have been attached to each other along the side walls 7, 8; 7', 8'; 7", 8" thereof. The plate shaped entity 3 has a bottom surface 9 and a top surface 10. It should be noted that the surfaces 9, 10 are not necessarily fully smooth and solid. Typically, the metal profiles have slightly rounded edges, and may have minor slits between them due to small irregularities of the side walls, but can still be considered to form a common top surface and a common bottom surface. In this embodiment, the cross-section of each metal profile is rectangular, and more particular it is square, but many other shapes are feasible as well, which will be further exemplified below.

[0015] The metal profiles 2 are typically made of steel, but other metals or alloys are feasible as well, such as aluminum.

[0016] The wedge shaped end pieces 4 extend perpendicularly to the metal profiles 2, and cover the ends 11 of the metal profiles 2. Each end piece 4 has a sloping top surface 13, which slopes downwardly from the top surface 10 to the ground in a direction away from the metal profile ends 11. The cover plate 1 is arranged to be placed with the metal profiles 2 extending along a driving direction of the road, and thereby the end pieces 4 constitute ramps facilitating the entering of the cover plate 1 with a vehicle. In addition to eliminating a sharp edge which can be inconvenient for at least some vehicles, the risk of a vehicle moving the cover plate 1 by pushing it with the wheels is reduced.

[0017] It should be noted that US 2004141809 discloses a kind of road plate, called road mat, comprising metal profiles having a rectangular cross-section. However, the road mat is exclusively arranged to be used for building a road surface on soft ground. As such the road mat does not fulfill strength requirements for a use as a cover plate for covering a hole of a road. For instance, the profiles are only interconnected with perpendicular stripes on the top surface of the road mat, and the profiles are arranged transversally of the driving direction. There is no teaching of any end pieces, etc. Consequently, there is no disclosure of a cover plate which can be compared with the cover plate according to this invention.

[0018] Returning to the first embodiment, each end piece 4 comprises an angle steel 14 having a first wall section 15, which covers the very ends 11 of the profiles 2, and a second perpendicular wall section 16, which covers an end surface portion of the top surface 10 of the plate shaped entity 3. The angle steel 14 is attached to the plate shaped entity 3, e.g. by welding. Furthermore, each end piece 4 comprises a V-shaped part 17, which has a longer leg portion 18 and a shorter leg portion 19. The longer leg portion 18 constitutes a bottom of the V-shaped part 17, covers an end surface portion of the bottom surface 9, and protrudes from the plate shaped entity 3. The longer leg portion 18 is attached to the plate shaped entity 3. The shorter leg portion 19 provides the sloping top surface 13 of the end piece 4, and is attached to the angle steel 14. In combination the angle steel 14 and the part of the longer leg portion that covers the end surface portion of the bottom surface 9 forms a U-shaped portion 20, which extends along the edge of the plate shaped entity 3, embracing an end portion 21 thereof. The rest of the V-shaped part 17 constitutes a wedge portion 22 protruding from the U-shaped portion 20 and having an upper surface, i.e. the top surface 13, sloping downwards away from the U-shaped portion 20.

[0019] Each end piece, or ramp, 4 comprises two road anchoring portions 23 arranged at the respective ends of the ramp 4. Each road anchoring portion 23 comprises an aperture 24 providing vertical passage through the ramp 4 for a road anchoring element, such as a ground screw.

[0020] The metal profiles 2 have been attached to each other by welded portions 29, 31 see Figs. 3, 5a and 5b, where the welded portions 29, 31 are lengthwise intermittently situated alternately at upper edges and lower edges of the metal profiles 2, as shown most schematically in Fig. 5a, or arranged in parallel on the top and bottom surfaces 10, 9, as shown in Fig. 5b. Other kinds of welding patterns are feasible as well. In addition to spot welding all-welding is feasible as well, and so are other kinds of attachment methods, though spot welding is a fast and strong enough alternative.

[0021] The plate shaped entity 3 comprises four lifting portions 25 arranged in a square and comprising keyholes 26, arranged in pairs in the top surfaces of two spaced profiles 2.

[0022] Further, the cover plate 1 comprises two strip shaped elements 27 extending laterally of the plate shaped entity 3, i.e. perpendicular to the profiles 2, at the bottom side 10 thereof and being attached to the plate shaped entity 3 at a distance from each other. Each strip shaped element 27 marks a boarder of a minimum portion of the cover plate 1, at each respective end thereof, which has to rest on the ground. More particularly, the strip shaped elements 27 are typically positioned closer to each respective end 5, 6 of the plate shaped entity 3 than to its centre, but at a distance from the ends that is long enough to ensure that the cover plate 1 manages to carry a predetermined load.

[0023] In order to exemplify typical dimensions, the cover plates 1 are often made 4-6 m long, and they are made to carry several tons of load. For instance, in order to manage a load of 12 tons, a 6 meter cover plate 1 has a thickness of about 50 mm, i.e. the height of the profiles 2 is about 50 mm, and the profile wall thickness is 5 mm. Given these figures, it would be possible for a person skilled in the art to re-dimension the cover plate when appropriate. It is reasonable to believe that profile heights of 40-60 mm and wall thicknesses of 4-6 mm would be common.

[0024] In accordance with a second embodiment of the cover plate 30, it comprises a different kind of profiles than the first embodiment, and except for the profiles it has the same construction as in the first embodiment. Each profile 31, 32 is basically U-shaped. By arranging the profiles 31, 32 in two layers, a first layer of first profiles 31, and a second layer of second profiles 32, as described below, a plate shaped entity 33 having a substantially flat top surface and a substantially flat bottom surface, which have similar properties as the top and bottom surfaces 10, 9 of the first embodiment, is obtained. In each layer the profiles 31, 32 are arranged adjacent to each other, with the open side of the profiles 31, 32 turned in the same direction. The first and second layers are arranged in engagement with each other with the open sides facing each other. Further the first profiles 31 are laterally displaced relative to the second profiles 32 by half the width of the profiles 31, 32. Thereby the longitudinal edges 34, 35 at the mouths of the profile openings abut on the inner bottom surfaces 36, 37 of opposite profiles 31, 32. When the profiles 31, 32 are assembled to form the plate shaped entity 33 profiles 31, 32 of the first and second layers are alternately attached to each other, e.g. by spot welding along the edges 34, 35 of the profiles 31, 32 to the inner surfaces 36, 37 of the profiles 31, 32, and by spot welding of the adjacent profiles to each other at the top and bottom surfaces of the plate shaped entity 33, like in the first embodiment. After having attached all profiles with each other, the outermost profile at each side of the plate shaped entity 33 will have a residual open aperture which is covered by a strip, or the aperture is covered by arranging an additional profile 38 being a half U-profile, i.e. an angle steel shaped profile.

[0025] In accordance with a third embodiment of the cover plate 40, as shown in Fig. 7, the metal profiles 41 are arc shaped in their longitudinal direction. This means that the cover plate 40 is vault shaped, or concave, though to a minor extent. For example, when placed on flat ground, the bottom surface of a four meter long cover plate 40 has a maximum height D above ground that is about 10 mm. Thus, according to this example, the height above ground D is substantially smaller than the height of the metal profile 41 mentioned above.

[0026] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive; the invention is not limited to the disclosed embodiments.

[0027] Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. A cover plate for covering a hole of a road, the cover plate comprising several elongated metal profiles arranged side by side, each metal profile having opposite side walls, the adjacent side walls of adjacent metal profiles abutting on each other, wherein the metal profiles have been attached to each other along the long sides thereof, the metal profiles thereby forming a plate shaped entity having a bottom surface and a top surface, the cover plate further comprising elongated wedge shaped end pieces attached at opposite ends of the plate shaped entity, extending perpendicularly to the metal profiles, covering the ends of the metal profiles, and each having a sloping top surface, the cover plate thereby being arranged to be placed with the metal profiles extending along a driving direction of the road.

2. The cover plate according to claim 1, wherein the metal profiles are arc shaped in their longitudinal direction.

3. The cover plate according to claim 1 or 2, wherein the metal profiles have been attached to each other by welded portions, where the welded portions are lengthwise intermittently situated alternately at upper edges and lower edges of the metal profiles.

4. The cover plate according to any one of the preceding claims, wherein the metal profiles have rectangular cross sections.

5. The cover plate according to any one of the preceding claims, wherein each ramp comprises a U-shaped portion extending along the edge of the plate shaped entity embracing an end portion thereof, and a wedge portion protruding from the U-shaped portion and having an upper surface sloping downwards away from the U-shaped portion.

6. The cover plate according to any one of the preceding claims, wherein each ramp comprises at least one road anchoring portion comprising an aperture providing vertical passage for a road anchoring element.

7. The cover plate according to any one of the preceding claims, comprising two strip shaped elements extending laterally of the plate shaped entity at a bottom side thereof and being attached to the plate shaped entity at a distance from each other, the strip shaped elements marking a boarder of a minimum portion of the cover plate, at each respective end thereof, which has to rest on the ground.

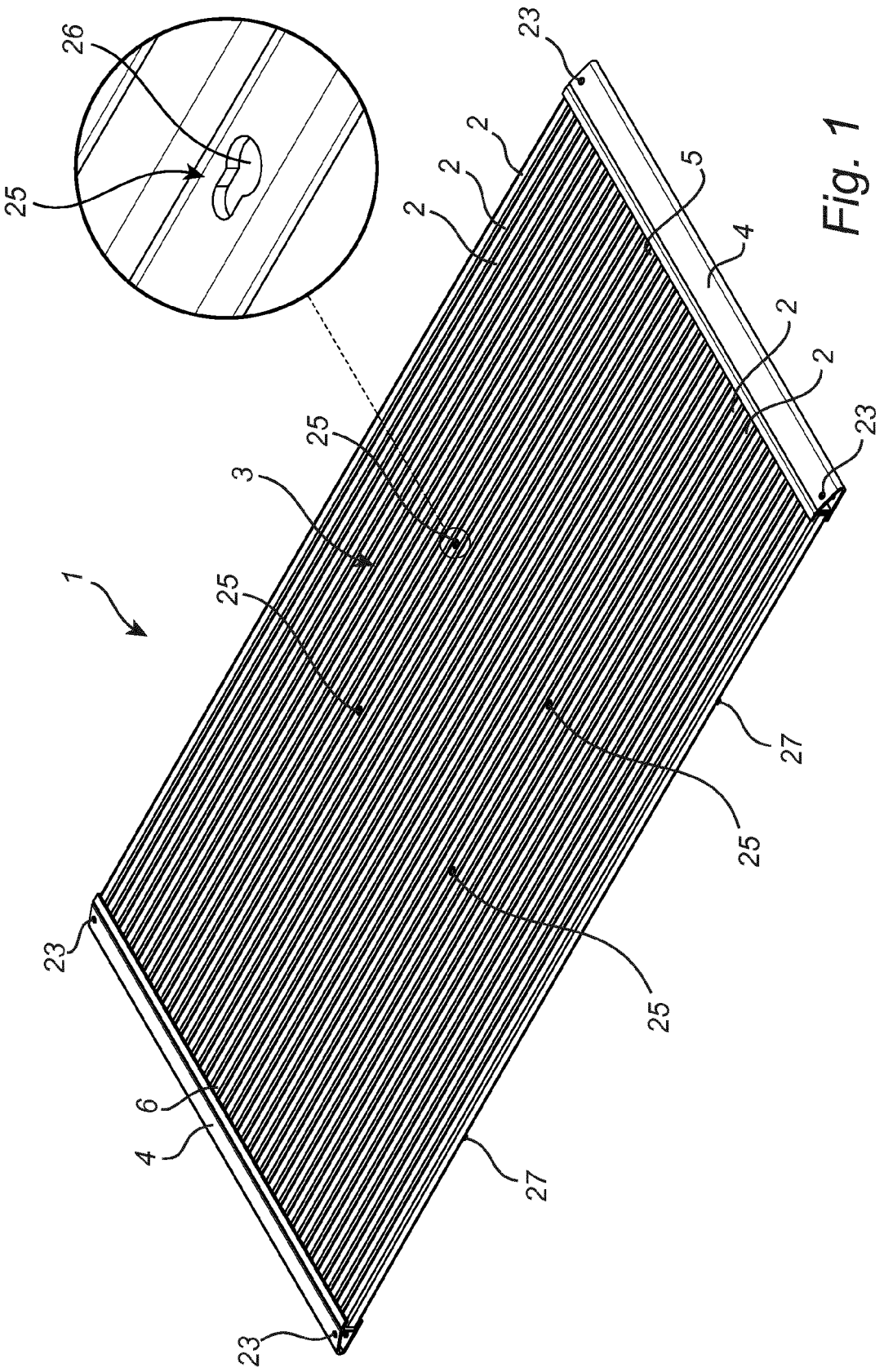

Fig. 1

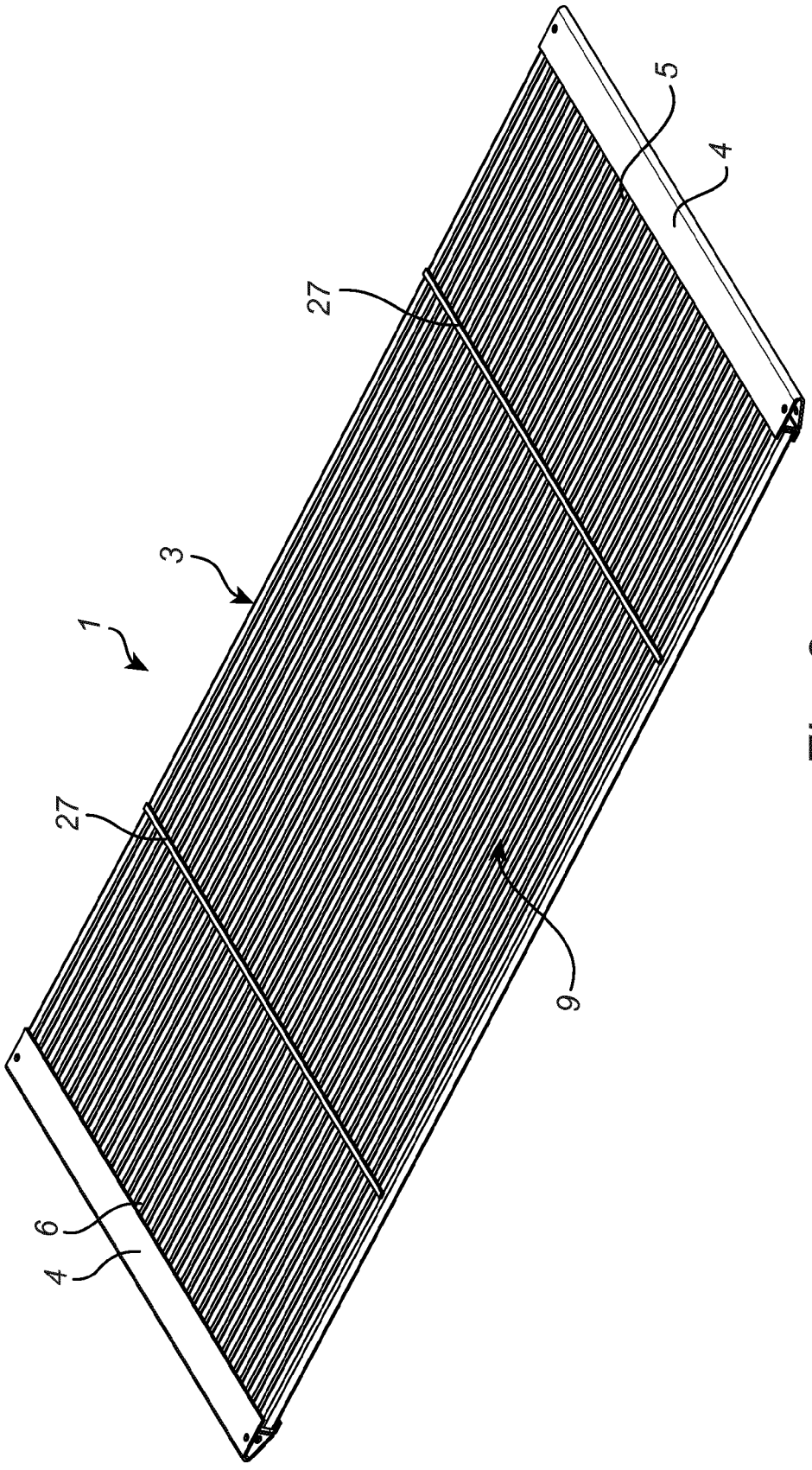

Fig. 2

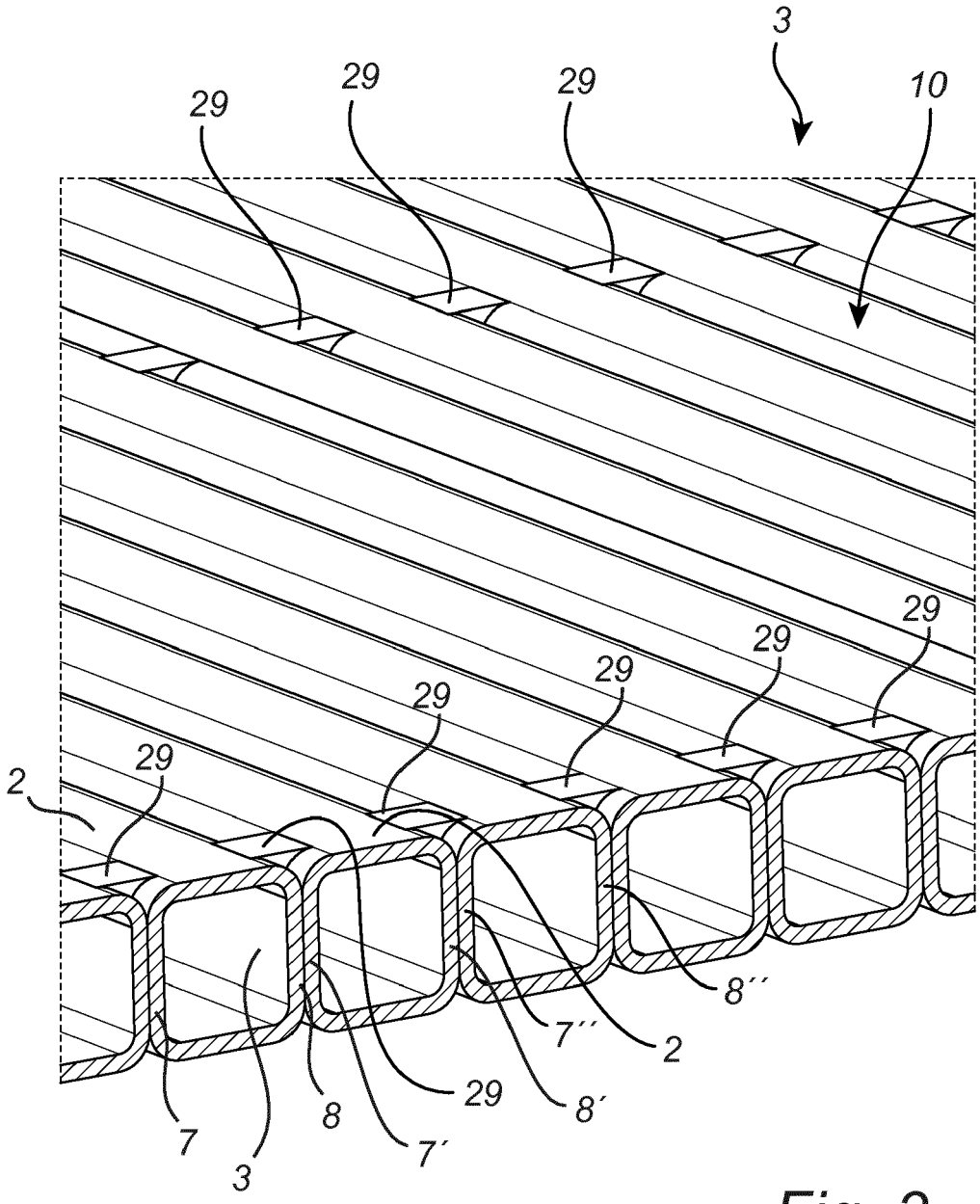

Fig. 3

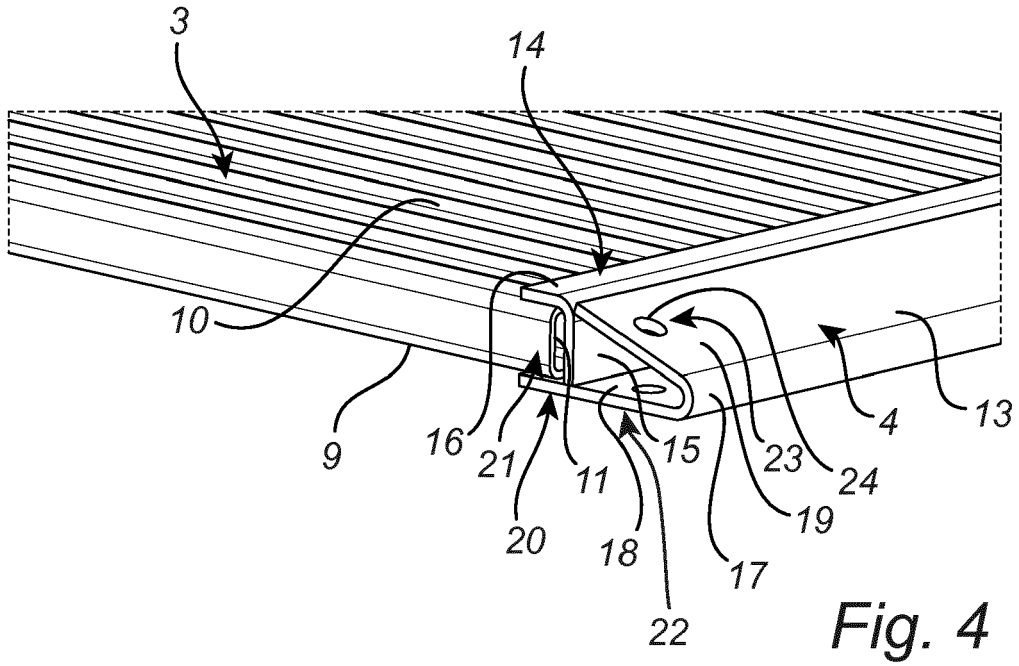

Fig. 4

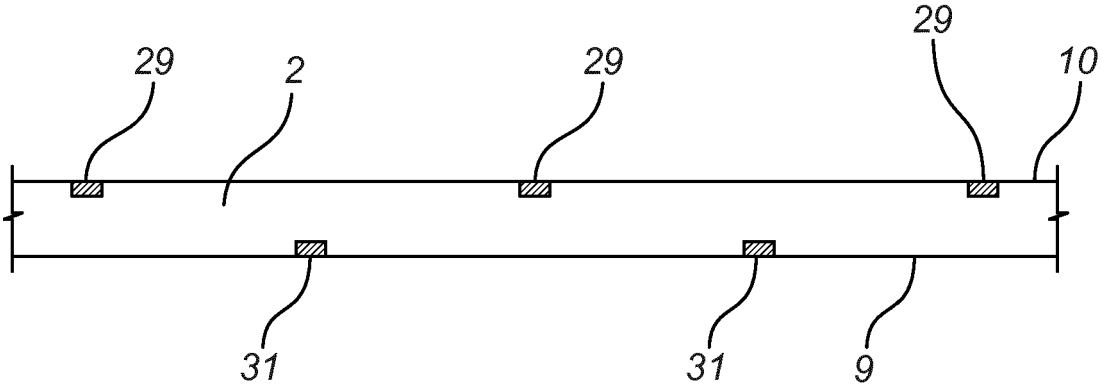

Fig. 5a

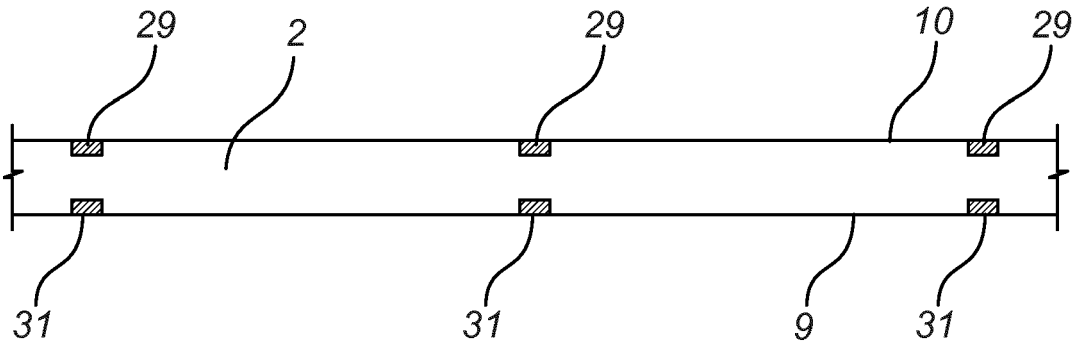

Fig. 5b

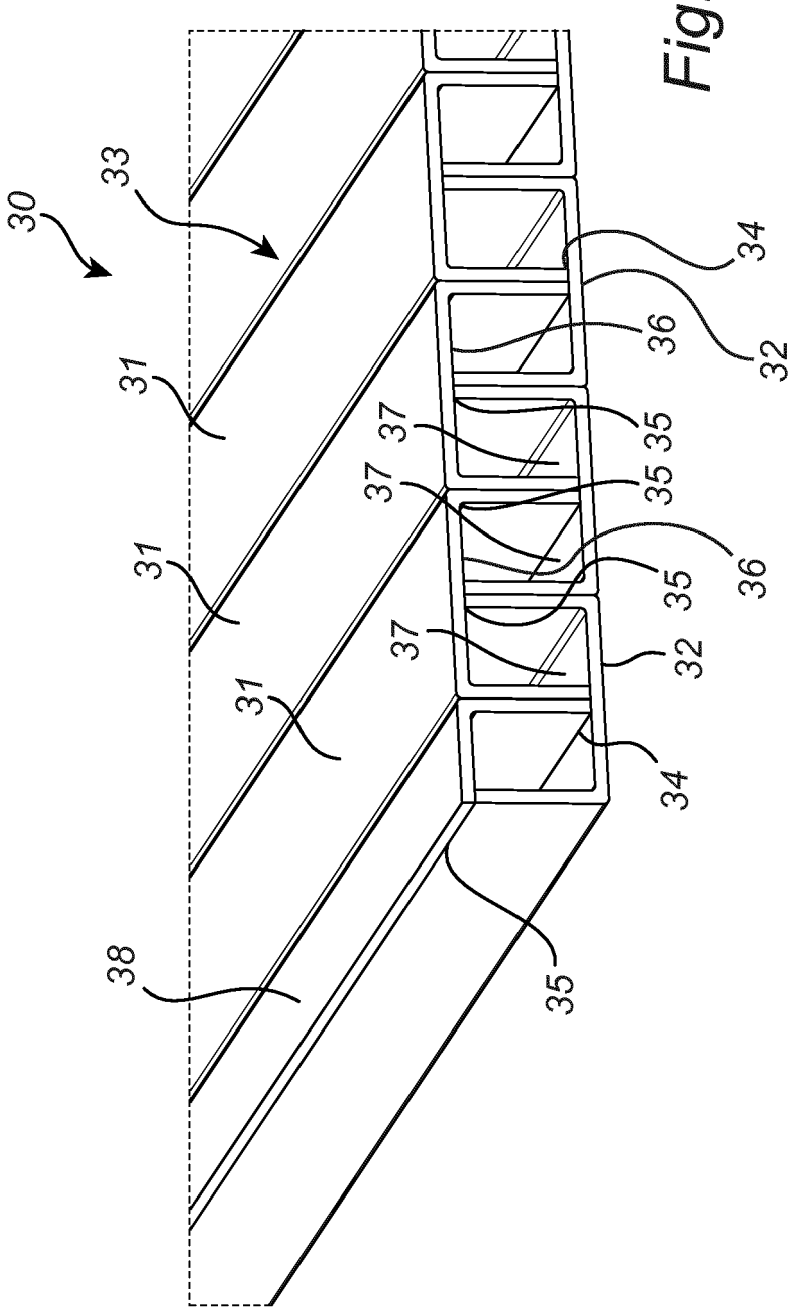

Fig. 6

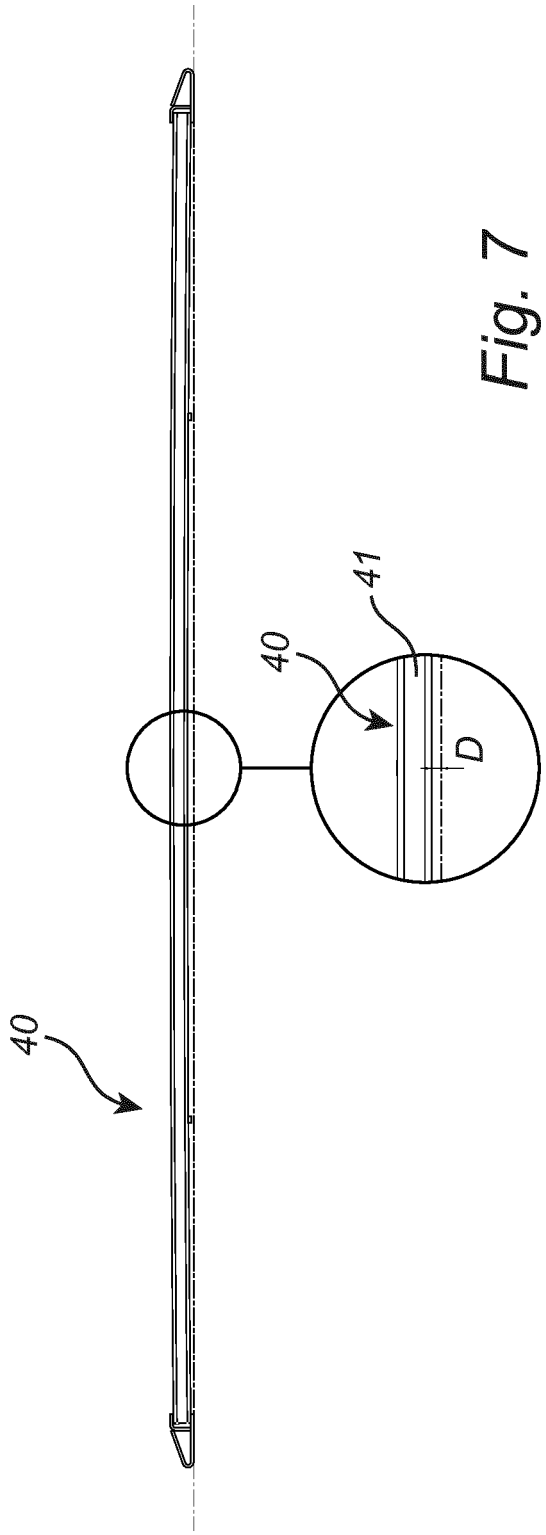

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 9476

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 April 2015	Kremsler, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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