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(54) **A DRAINAGE ASSEMBLY**

(57) The present invention describes a drainage assembly (100) having adequate load bearing capacity for draining water from depth restricted man-made surfaces comprising of a plurality of interconnected double walled base channel element (1) with/without filling agents, featuring a locking rib (10) along the inner walls of the said channel element (1) for mechanically locking the grating/cover (7) with a transversely located locking plate (3); a filter (19) to prevent the entry of undesirable objects into the said drainage assembly (100); a plurality of anchor bolts (16) and composite anchor plates (8) for securely fixing the said drainage assembly (100) into the

surrounding concrete surface and to support heavy compressive loads and prevent caving-in of the walls of the said base channel element (1); a plurality of bottom connector (2) for connecting at least two of the said base channel element (1) to form a water tight permeant seal, a plurality of end cap adapted to fit on either ends of the said channel element (1); and a plurality of drainage outlets for draining water. In addition, the said drainage assembly (100) has the flexibility of placing the grating/cover (7) on various edge configuration of the said base channel element (1)

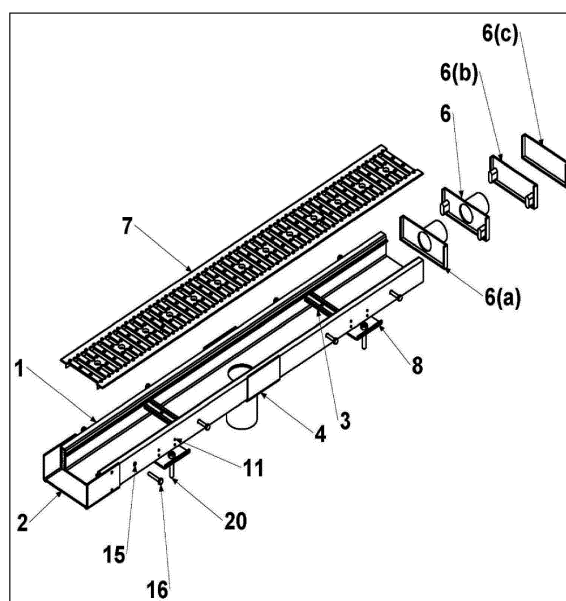


FIG. 1

Description

Technical field

[0001] The present invention relates to a base channel element and drainage assembly. More particularly, the present invention relates to a drainage assembly having adequate load bearing capacity and comprises of a plurality of base channel elements, drainage outlet fitting and end cap elements providing a water tight connection between adjacent elements. More particularly, it relates to the drainage channel assembly featuring a locking rib providing the flexibility of fixation and locking of the various frames and gratings/covers and a plurality of anchor bolts and a composite anchor plate for securing the drainage assembly into man-made surface areas while reducing the installation time of the drainage assembly.

Background art

[0002] Modular trench drainage assembly are well known in the prior art and typically consists of a plurality of base channels, open at the top and covered with grates, and recessed into a surface, such as a floor or the ground, commonly used to collect and direct rainwater to underground storm sewers to prevent flooding and to decrease runoff. Drainage assembly are available for various outdoor industrial and commercial sites with restricted depth such as indoor and outdoor multi-level parking lots, garages, podiums, balconies, terraces, etc.

[0003] The top opening of the drainage channel is usually covered with grating/cover and is flush with the surface to be drained. The channel segments are embedded in concrete within a trench prepared to receive the channel segments in proper order and with proper slope. The drainage assembly are usually installed on the surrounding surface. Thus, the choice of the channel element is an important factor in selecting the drain system for a particular application. The drain system is made up of variety of material for specific application to sustain for longer period without degradation. Various material that is utilized for manufacturing drain channels include galvanized steel, stainless steel, ductile iron, cast iron, pre-stressed concrete, composite resin, plastic, fiberglass, PVC, HDPE and, brass composite and similar kind. The channel material expands and contracts in accordance with the adjacent concrete ground. Therefore, the thickness and strength of the material depends on the application. The strength of the channel and grating/cover system is derived from its anchoring to the surrounding concrete. There is an increasing demand for modern drainage assembly with improved mechanical stability and ease of fixation.

[0004] A disadvantage of conventional trench drainage assembly is the potential safety hazard resulting from the lack of a connection, and removability between the grating/cover and the base channels. Because the grating/cover is unattached to the base frame member, un-

intentional, unauthorized or accidental removal of the top cover due to weight and force, such as a passing vehicle, is applied thereto, and thus, could result in injury to a pedestrian or damage to a vehicle or entry of undesirable debris into the drainage assembly.

[0005] Another disadvantage of the conventional trench drainage assembly is the distortion of the side-walls of the base channels due to lack of mechanical stability, which adversely effects the connection between the adjacent channels and the grating/ cover leading to unwanted leakage of the water. In addition, the drainage assembly needs to be supported with fillers to provide mechanical stability and durability. Further, the channels should be light in weight and easy to carry and install with minimum people. However, there are many plastic drains and composite drains which are light but are very brittle and therefore break or cave in when the load is applied.

[0006] Thus, there is an increasing demand for the drainage assembly that are easy to manufacture and easy to install while ensuring improved mechanical stability and reliability of fixation. The present invention proposes a drainage assembly which would be versatile and meet all the needs mentioned above.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an object of the present invention to provide a drainage assembly featuring a locking rib on the inner wall of the base channel element for mechanically fastening the grating/cover to the base channel element that facilitates the easy removal of the grating/ cover from the base channel element in a simple, yet expedient manner and prevent unintentional, accidental or unauthorized open drain conditions.

[0008] Another object of the present invention is to provide a drainage assembly featuring a plurality of composite anchor plates riveted to the inner edge of the outer wall of the drainage channel element for anchoring the drainage channel elements into a surface area while reducing the installation time of the drainage assembly.

[0009] Yet another object of the present invention is to provide a drainage channel elements which provides the flexibility of placement of various frames and grating/covers with no restriction of the load carrying capacity and having no predetermined positions.

[0010] These, as well as other objects, are achieved in accordance with an exemplary embodiment of the present invention in which a modular drainage assembly (100) is provided for placement into restricted depth areas such as indoor and outdoor multi-level parking lots, garages, podiums, balconies, terraces, or the like. In particular, the present invention describes a modular drainage assembly (100) having adequate load bearing capacity and comprising of a plurality of interconnected base channel elements (1) having flexibility of placement various grating/cover (7) and a plurality of anchor bolts (16) and anchoring plates (8) for securely fixing the said drainage assembly (100) into the surrounding concrete.

[0011] According to the present invention, the drainage assembly (100) comprises of a plurality of base channel elements (1) having a bottom wall and a double layered side walls extend upwardly from opposed edges of the bottom wall to form a trough for collecting and/or discharging water. The said double layered side wall of the said base channel element (1) consists of an outer wall and inner wall separated by a cavity. The said cavity of the said double walled base channel element (1) can be optionally filled with/without filling agent but not limiting to polymer concrete to provide additional load bearing capacity to the said drainage assembly (100).

[0012] The said channel element (1) is characterized by a locking rib (10) along the inner walls of the said base channel element (1) for mechanically fixing the filter (19) and the grating/cover (7) to a transversely located locking plate (3). The said locking plate (3) locks the grating/cover (7) to the drainage channel element (1) and consists of at least two adjustable surfaces preferably a circumferentially sloping planar surface that is adapted to engage the said locking plate (3) such that upon clockwise rotation the said locking plate (3) engages with the said locking rib (10) so as to not move any further.

[0013] The said filter (19) is adapted to fix atop the said locking rib (10) and runs along the length of the said base channel element (1). The said filter (19) is provided to prevent the entry of undesirable objects, such as leaves and debris, among other things, into the said drainage assembly (100).

[0014] The said base channel element (1) further comprises of a plurality of anchor bolts (16) and a plurality of composite anchor plates (8) riveted to the inner edge of the outer wall of the said base channel element (1) so as to securely anchor the said base channel element (1) into the depth restricted man-made surfaces. The said anchor bolts (16) will become embedded in the concrete poured between the said base channel element (1) and the trench, securing the said drainage assembly (100). In addition, the said anchor bolts (16) helps prevent caving-in of the side walls of the said base channel element (1). The said anchor plates (8) are substantially rigid plates which can be fastened to the concrete pavements using anchor fasteners (20).

[0015] Further, the said base channel element has the flexibility of placing the grating/cover (7) on the said base channel element (1) with/without edge configuration. The said base channel element (1) are available in various edge configuration such as a horizontal plane edge for fixing the said horizontal plan grating/cover (7) or a built-in FPR edge (12) for fixing the said grating/cover with edge height (7(a)), or a planner edge adapted to fit a metal edge frame (13) for fixing the said heavy duty grating/cover (7(b)) or a combination thereof.

[0016] Furthermore, the said drainage assembly (100) comprises of a plurality of bottom connectors (2) to connects at least two of the adjacent base channel elements (1) providing water tight connection between the adjacent channel elements (1); at least a pair of end caps with/with-

out lugs (6(b) or 6(c)) adapted to fit on either ends of the said base channel element (1) and grating/cover (7); and a plurality of drainage outlets which includes either a side drainage outlet connector (5), or a bottom drainage outlet connector (4), or an end drainage outlets with/without lugs (6 or 6(a)) or a combination thereof, mounted on the surface of the said base channel element (1) in a functionally operative configuration to discharge water.

[0017] The drain system assembly (100) is preferentially fiberglass-reinforced plastic (hereinafter referred to as FRP) or a combination thereof.

[0018] Other objects, features and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views.

BRIEF DESCRIPTION OF DRAWING

[0019] These and other features, aspects and advantages of the present invention are better understood when the following detailed description of the invention is read with reference to the accompanying drawings, in which:

Figure 1: illustrates a schematic of the drainage assembly;

Figure 2 and 2(a): illustrates a schematic of the mechanical locking of the filter with the locking plates attached to the locking rib and the double walled base channel element (1) with/without concrete filling;

Figure 3: illustrates the moulding process for moulding the base channel elements of the drainage assembly;

Figure 4 and 4(a): illustrates a schematic of the mechanical locking of the flat or heavy duty grating/cover with/without the L shaped metal frame onto the base channel element;

Figure 4(b), 4(c), and 4(d): illustrates a schematic of the cross-sectional profile of the mechanical locking of the flat or heavy duty grating/cover with/without the L shaped metal frame onto the base channel element;

Figure 5(a), 5(b), 5(c), 5(d), 5(e), 5(f), 5(g), and 5(h): illustrates the bottom connector, side outlet connector, bottom outlet connector, end outlet connector with lugs, end outlet connector without lugs, end caps with lugs, end cap without lugs, and anchor plate;

Figure 6(a) and 6(b): illustrates the bottom connector used for connecting the two adjacent base channel elements with/without rivet;

Figure 7(a) and 7(b): illustrates the curved base channel elements used for non-linear applications;

Figure 8: illustrates the base channel elements with cascading channel elements;

Figure 9 and 9(a): illustrates a schematic of the fixation of the drainage assembly on to the depth restricted man-made surface and the bottom anchoring of the drainage assembly on to the bottom concrete surface.

DETAILED DESCRIPTION OF INVENTION

[0020] Various methods and apparatus embodiments of the invention are set forth below. While the invention is described with reference to specific preferred methods and apparatus including those illustrated in the drawings, it will be understood that the invention is not intended to be so limited. To the contrary, the invention includes numerous alternatives, modifications and equivalents as will become apparent from consideration of the present specification including the drawings, the foregoing discussion, and the following detailed description.

[0021] Fig. 1 of the accompanying drawings illustrates a schematic of the drainage assembly (100). It comprises of a plurality of longitudinally extending open-topped base channel elements (1) interconnected with the bottom connector (2) (as illustrated in Fig. 5(a) of the accompanying drawings). As illustrated in Fig. 6(a) the said bottom connector (2) connects at least two of the adjacent base channel elements (1) providing water tight connection between the adjacent channel elements (1). A sealant or adhesive may be used between the adequate surface of the said bottom connector (2) and the adequate surface of the said base channel elements (1) such that it provides large surface area for a water tight, permanent seal between successive base channels elements (1).

[0022] The construction of the said base channel elements (1) comprises of a bottom wall and a double layered side walls that extends upwards from the opposed edges of the bottom wall to form a trough for collecting and/or discharging water. The said double layered side wall of the said base channel element (1) consists of an outer wall and inner wall separated by a cavity. The said cavity of the said doubled walled base channel element (1) can be used with/without the filling agents not limiting to polymer concrete depending upon the requirement and usage. Areas such as indoor/outdoor multi-level parking lots, garages, etc. or areas having vehicular movement and similar applications require channels having additional load bearing capacity. Fig. 3 of the accompanying drawings illustrates the filling of the said cavity of the double walled base channel element (1) with the polymer concrete filler (9). There are many different polymers available and known in prior arts that can be used as polymer concrete fillers. The said doubled walled base channel element (1) can be used with/without the polymer concrete filling depending upon the requirement and usage.

[0023] The said base channel elements (1) with polymer concrete filling, allows for the permanent fixation of the said bottom connector (2) using rivets (11). As illustrated in Fig. 6(b) of the accompanying drawings, the said

rivet (11) are used for permanent fixation of the said base channel elements (1) along with the bottom connector (2), in addition to the chemical bonding of the glue/adhesive. The said rivets (11) are fixed on the sidewalls of the said bottom connector (2) and the said polymer concrete filled base channel element (1). The said rivets (11) do not extend beyond the polymer concrete filling thus; there are no chances of water leakage. Such permanent fixation mechanism of using rivet is not practically possible in other design due to the lack of double walled construction of the base channel elements.

[0024] Material that is utilized for manufacturing the said base channel element (1) is not limited to galvanized steel, stainless steel, ductile iron, cast iron, pre-stressed concrete, composite resin, plastic, fiberglass, PVC, HDPE, brass, or coloured composite and/or a combination thereof. A choice of the channel is an important factor considering the application of drain system. The preferred material used in the present invention is FRP/fiberglass polymer.

[0025] The said base channel element (1) features a locking rib (10) along the inner walls of the said base channel element (1) for mechanically fixing the said grating/cover (7) to a locking plate (3) as illustrated in Fig. 4 of the accompanying drawings. The said locking plate (3) locks the grating/cover (7) to the said base channel element (1) and prevents the said grating/cover (7) from loosening. The said locking plate (3) is transversely located all along the length of the said base channel element (1). The said locking plate (3) holds a specific geometry (as illustrated in Fig. 5(h) of the accompanying drawings) and includes at least two adjustable surfaces preferably a circumferentially sloping planar surface that is adapted to engage the said locking plate (3) such that upon clockwise rotation the said locking plate (3) engages with the said locking rib (10) so as to not move any further. The said locking plate (3) is a detachable element and thus can be fixed anywhere along the length of the said base channel element (1) over the said locking rib (10) of the said drainage assembly (100) in accordance with the requirement and slots of the said grating/cover (7). Each of the said locking plate (3) has a threading wherein the said threaded screw (18) is inserted for securely locking the said grating/cover (7) as illustrated in Fig. 4(a) of the accompanying drawings. The said grating/cover (7) is securely fitted along the said base channel element (1) onto the said locking rib (10) by means of matching grooves on the said locking plate (3). In another arrangement, this fitting can also be done by means of threading or staggered and where the said grating/cover (7) and the said base channel element (1) are independent of each other in the joints. The locking design of the said drainage assembly (100) can be customized as per the need and application (as seen in Fig. 1 of the accompanying drawings) where the said base channel element (1) and the grating/cover (7) are independent of each other in the joints.

[0026] The grating/cover (7) covers the top opening of

the said base channel element (1) forming the said drainage assembly (100). The said grating/cover (7) runs along the length of the said base channel element (1) and are mechanically fixed with threaded screw (18). The said grating/cover (7) are made up of different materials such as plastic, fiberglass reinforced polymer (FRP), stainless steel, mesh, ductile iron or a combination thereof. The said base channel element (1) is adapted to fit the said grating/cover (7) which flush with the surrounding surface to be drained. Each of the said grating/cover (7) is slotted element selected from wide range types such as heel safe, squared mesh, mesh, slotted, transverse, perforated, draining asphalt, solid top cover, L-shaped, T-shaped and the like. The said grating/cover (7) may be selected from a horizontal plane grating/cover (7), or a grating/cover with edge height (7(a)), or a heavy-duty grating/cover (7(b)) with metal edge protection. The said grating/cover (7) has hole in between the rows of slots for securely fixing it with the said base channel element (1) using threaded screw (18).

[0027] In another embodiment of the present invention, the said base channel element (1) are provided with/without various edge configuration for covering the said base channel element (1) with the said grating/cover (7) depending upon the plumbing requirements and usage. In one of the possible configuration the said base channel element (1) features a horizontal plane edge for fixing the said horizontal plan grating/cover (7) which can be locked to the said locking plate (3) by a counter sunk screw (7(d)) as illustrated in Fig. 4(b) of the accompanying drawings. In another configuration, the said base channel element (1) features a built-in FPR edge (12) for fixing the said grating/cover with edge height (7(a)) which can be locked to the said locking plate (3) as illustrated in Fig. 4(c) of the accompanying drawings. Alternatively, in yet another configuration, the edge of the said base channel element (1) is adapted to fit a metal edge frame (13), which is generally L- brace type or L-shaped structures used for fixing the said heavy duty grating/cover (7(b)) with metal edge for lateral protection as illustrated in Fig. 4(d) of the accompanying drawings. The said metal edge frame (13) can be screwed or bolted onto the said nut fasteners (15) present on the edge of the said base channel element (1) and the vertical surface or spine of the L of the said metal edge frame (13) extends vertically upward from the edge of the said base channel element (1) working like a lateral protective edge for the said heavy duty grating/cover (7(b)) as illustrated in Fig. 4(a) of the accompanying drawings. The said heavy duty grating/cover (7(b)) can be locked to the said locking plate (3) by a socket button head (7(e)).

[0028] In another embodiment of the present invention, the said base channel element (1) can be fitted with a filter (19) as illustrated in Fig. 2 and 2(a) of the accompanying drawings. The said filter (19) consists of circular mesh with holes in between the mesh for securely fixing it to the said locking plate (3) and has been provided to prevent the entry of undesirable objects, such as leaves

and small branches, among other things, into the drainage assembly. The said filter (19) is adapted to be fitted on top of the said locking rib (10) of the said base channel element (1). The said filter (19) can be fixed with the said locking plate (3) with the said threaded screw (18) for secure fixing

[0029] In another embodiment of the present invention, the said drainage assembly (100) can be fitted with end caps with lugs (6(b)) or end caps without lugs (6(c)) or end caps with drainage outlet with lugs (6) or end caps with drainage outlet without lugs (6(a)) as illustrated in Fig. 5(d), 5(e), 5(f), 5(g) of the accompanying drawings. The said end caps with lugs (6(b)) and the said end caps drainage outlet with lugs (6) can be used to fit the said base channel element (1) without polymer concrete filling. The said end caps (6 and 6(b)) locks into the hollow channel and can be hammered and glued with a sealant/adhesive glue. The said end caps without lugs (6(c)) and end caps drainage outlet without lugs (6(a)) can be used to fit the said base channel element (1) with polymer concrete filling, as the surface area of the polymer concrete filled base channel unit increases as illustrated in Fig. 7(b), the said end caps can be easily glued onto the vertical gap of the said base channel element (1). There are different kinds of arrangements possible by making use of the said end cap (6(b) or 6(c)) and the said end cap with drainage outlet (6 or 6(a)) for the said base channel element (1) to drain the water. It is possible to have an arrangement where the said drainage assembly (100) has end caps (6(b) or 6(c)) fitted at defining ends to achieve closure of the drainage system. In another arrangement, one of the defining ends of the said drainage assembly (100) has end cap (6(b) or 6(c)) fitted at one end for closing and the other end with end cap with drainage outlet (6 or 6(a)) to drain water. Alternatively, one can have end caps with drainage outlet (6 or 6(a)) fitted on both the ends for draining channel water. Any of such arrangements, can be chosen for the said drainage assembly (100) to drain water either considering application or the plumbing arrangement.

[0030] In another embodiment of the present invention, the said drainage assembly (100) can be fitted with a plurality of drain outlets to drain water in accordance with the plumbing arrangements. Such an arrangement can have a plurality of bottom drainage outlet connector (4) (as illustrated in Fig. 5(c) of the accompanying drawings) at suitable distance connecting the adjacent base channel elements (1) while draining water to suit the position of plumbing system. In addition, the water can also be drained out using a plurality of side drainage outlet connector (5) (as seen in Fig. 5(b) of the accompanying drawings) fitted at suitable distance along the sides of the said base channel element (1) to drain water. In such an arrangement one may or may not have the need for the said bottom drainage outlet connector (4) or end cap drainage outlet (6 or 6(a)) as water can be drained through the side connector outlets (5). The design of the said drainage assembly (100) can be customized as per

the plumbing requirements and usage.

[0031] In another embodiment of the present invention, the said base channel element (1) features a plurality of anchor bolts (16) attached to the outer surface of the said base channel element (1) as illustrated in Fig. 1 of the accompanying drawings. When the said drainage assembly (100) is installed, the said anchor bolts (16) will become embedded in concrete poured between the said base channel elements (1) and the trench as illustrated in Fig. 9 of the accompanying drawings. For the installation of the said drainage assembly (100) the natural soil surface (27) of the trench is smoothed to form a sub-floor (26) on which a compacted layer (25) is formed for supporting the said drainage assembly (100). The base channel element (1) of the said drainage assembly (100) is placed on the surrounding concrete (22) poured onto the said compacted layer (25). And when concrete is filled between the said base channel elements (1) and the trench, the said anchor bolts (16) gets embedded into the concrete pour (23) securely fixing the said base channel element (1) and prevent floating. The said anchor bolts (16) helps support heavy compressive loads and prevent caving-in of the walls of the said base channel element (1). The said anchor bolts (16) are preferably formed of a suitable iron or steel bar. In addition, the said anchor bolt (16) provides mechanical support to the said base channel element (1) imparting greater mechanical stability to the drainage assembly (100).

[0032] Further, the said base channel element (1) features a plurality of composite anchor plate (8) riveted to the inner edge of the outer wall of the said base channel element (1) for anchoring the said drainage assembly (100) to pavements areas as illustrated in Fig. 9(a). For installation of the said drainage assembly (100) on to the existing RCC slab (24), a chemical grout (21) has to be applied onto the surrounding concrete then the said base channel unit (1) can be fixed. The said composite anchor plate (8) then can be anchored into the said RCC slab (24) by utilizing the anchor fasteners (20) which may extend a certain distance into the ground. The said composite anchor plate (8) is preferably formed of a suitable iron or steel bar. The number of the said anchor plate (8) attached to the said drainage assembly (100) varies depending upon the application and usage.

[0033] In another embodiment of the present invention, the said base channel element (1) of the said drainage assembly (100) can be made with curved channel element (17) as seen in Fig. 7(a) of the accompanying drawings. This arrangement can be used where non-linear arrangements such as curved, stepped, or an angle at a certain degree is desirable, and can be customized according to the drainage requirement of the surrounding area. As can also be noted, the said curved channel element (17) can be filled with/without the said polymer concrete filling depending upon the load bearing capacity required and can be connected using the said bottom connectors (2) as illustrated in Fig. 7(b) of the accompanying drawings. Further, it is desirable to have the said

polymer concrete filling at the corner joints as illustrated in Fig. 7(a) and 7(b) of the accompanying drawings to avoid any water leakage. In addition, the said drainage assembly (100) can be formed of different shapes, and be aligned in various configurations, including non-linear shapes or be formed of greater or lesser dimension or be formed at an angled alignment relative to the standard channel elements known in the prior arts.

[0034] It shall be noted that the said base channel element (1) as disclosed is not limiting by the size or shape or length or process of making the channel mould. Thus, the said base channel elements (1) could be of any length without the limitation of moulds. The said base channel element (1) is the permanent skin for the final product which gives good quality of finish.

[0035] In another embodiment of the present invention, the invention combines the best properties of FRP as well as polymer concrete to create a product which is superior in properties than the individual composites FRP and polymer concrete with their respective limitations. Further, the binding resins of both the FRP and polymer concrete can be changed to suit different applications.

[0036] In another embodiment of the present invention, the arrangements of the said base channel elements (1) are made in step-like/cascade arrangement for directional flow of drain water. Fig. 8 of the accompanying drawings illustrates the arrangement of the said cascading channel element (14) in a cascading manner for directional flow of water. In this arrangement, the said cascading channel element (14) of varied height is connected to transport water from higher to lower level.

[0037] While considerable emphasis has been placed herein on the specific elements of the preferred embodiment, it will be appreciated that many alterations can be made and that many modifications can be made in preferred embodiment without departing from the principles of the invention. These and other changes in the preferred embodiments of the invention will be apparent to those skilled in the art from the disclosure herein, whereby it is to be distinctly understood that the foregoing descriptive matter is to be interpreted merely as illustrative of the invention and not as a limitation.

ADVANTAGES

[0038] The present invention of improved drainage assembly wherein,

1. The double walled base channel element (1) with/without filling agent for adequate load bearing capacity;
2. Flexibility of using the base channel element with/without edge adapted for different applications;
3. Base channel elements with/without curves for linear and non-linear plumbing applications;
4. Flexibility of using any form of grating/cover on the base channel elements;
5. Flexibility of locking the grating/cover along the

length of the base channel element;

6. Base channel element using the optimum strength of FRP material combined with compressive strength of polymer concrete whenever necessary.

[0039] While considerable emphasis has been placed herein on the specific elements of the preferred embodiment, it will be appreciated that many alterations can be made and that many modifications can be made in preferred embodiment without departing from the principles of the invention. These and other changes in the preferred embodiments of the invention will be apparent to those skilled in the art from the disclosure herein, whereby it is to be distinctly understood that the foregoing descriptive matter is to be interpreted merely as illustrative of the invention and not as a limitation.

Claims

1. A drainage assembly (100) for draining water comprising plurality of:

- i. an interconnected base channel element (1) having a bottom wall and a double layered side walls extend upwardly from opposed edges of the said bottom wall to form a trough;
- ii. a locking rib (10) along the inner wall of the said channel element (1) for mechanically locking the grating/cover (7) with a transversely located locking plate (3);
- iii. a filter (19) adapted to be fitted on the said locking rib (10);
- iv. an anchor bolt (16) attached to the outer wall of the said channel element (1);
- v. a composite anchor plate (8) riveted to the inner edge of the outer wall of the said channel element (1);
- vi. a bottom connector (2) for connecting at least two of the said base channel element (1);
- vii. an end cap adapted to fit on either ends of the said channel element (1) and grating/cover (7); and
- viii. a drainage outlets mounted on the surface of the said channel element (1) for draining water.

2. The drainage assembly (100) according to claim 1, wherein the said double layered side walled base channel unit (1) consisting of an outer wall and inner wall forming a cavity, wherein the said cavity can be optionally filled with the filling agents.

3. The drainage assembly (100) according to claim 2, wherein the said cavity of the said double layered side walled base channel unit (1) can be optionally filled with filling agents not limiting to polymer concrete for providing additional loadbearing capacity.

4. The drainage assembly (100) according to any preceding claim, wherein the said locking plate (3) consists of at least two adjustable surfaces preferably a circumferentially sloping planar surface that is adapted to engage the said locking plate (3) such that upon clockwise rotation the said locking plate (3) engages with the said locking rib (10) so as to not move any further.

5. The drainage assembly (100) according to any preceding claim, wherein the said filter (19) runs along the length of the said base channel element (1) to prevent the entry of undesirable objects, such as leaves and debris, among other things, into the said drainage assembly (100).

6. The drainage assembly (100) according to any preceding claim, wherein the said anchor bolts (16) are embedded into the concrete base to secularly anchor the said drainage assembly (100) when concrete is poured between the said base channel element (1) and the trench and helps prevent caving-in of the side walls of the said base channel element (1) providing mechanical support.

7. The drainage assembly (100) according to any preceding claim, wherein the said composite anchor plates (8) are substantially rigid plates which can be fastened to the concrete pavements using anchor fasteners (20).

8. The drainage assembly (100) according to any preceding claim, wherein the said connecting elements (2) connects at least two of the adjacent base channel elements (1) providing water tight connection between the adjacent channel elements (1) and can be fixed using an adhesive glue and rivets (11).

9. The drainage assembly (100) according to any preceding claim, wherein the said drainage outlets are selected from either the side drainage outlet connector (5), bottom drainage outlet connector (4), or the end drainage outlets with/without lugs (6 or 6(a)) or a combination thereof, mounted on the surface of the said channel element (1) in a functionally operative configuration to discharge water.

10. The drainage assembly (100) according to any preceding claim, wherein the said drainage assembly (100) has the flexibility of placing the grating/cover (7) on the said base channel element (1) with/without edge configuration.

11. The drainage assembly (100) according to any preceding claim, wherein the said drainage assembly (100) has the flexibility of placing the grating/cover (7) on various edge configuration of the said base channel element (1) such as a horizontal plane edge

for fixing the said horizontal plan grating/cover (7) or a built-in FPR edge (12) for fixing the said grating/cover with edge height (7(a)), or a planner edge adapted to fit a metal edge frame (13) for fixing the said heavy duty grating/cover (7(b)) or a combination thereof. 5

12. The drainage assembly (100) according to any preceding claim, wherein the said drainage assembly (100) is preferentially fiberglass reinforced plastic (FPR) or a combination thereof. 10

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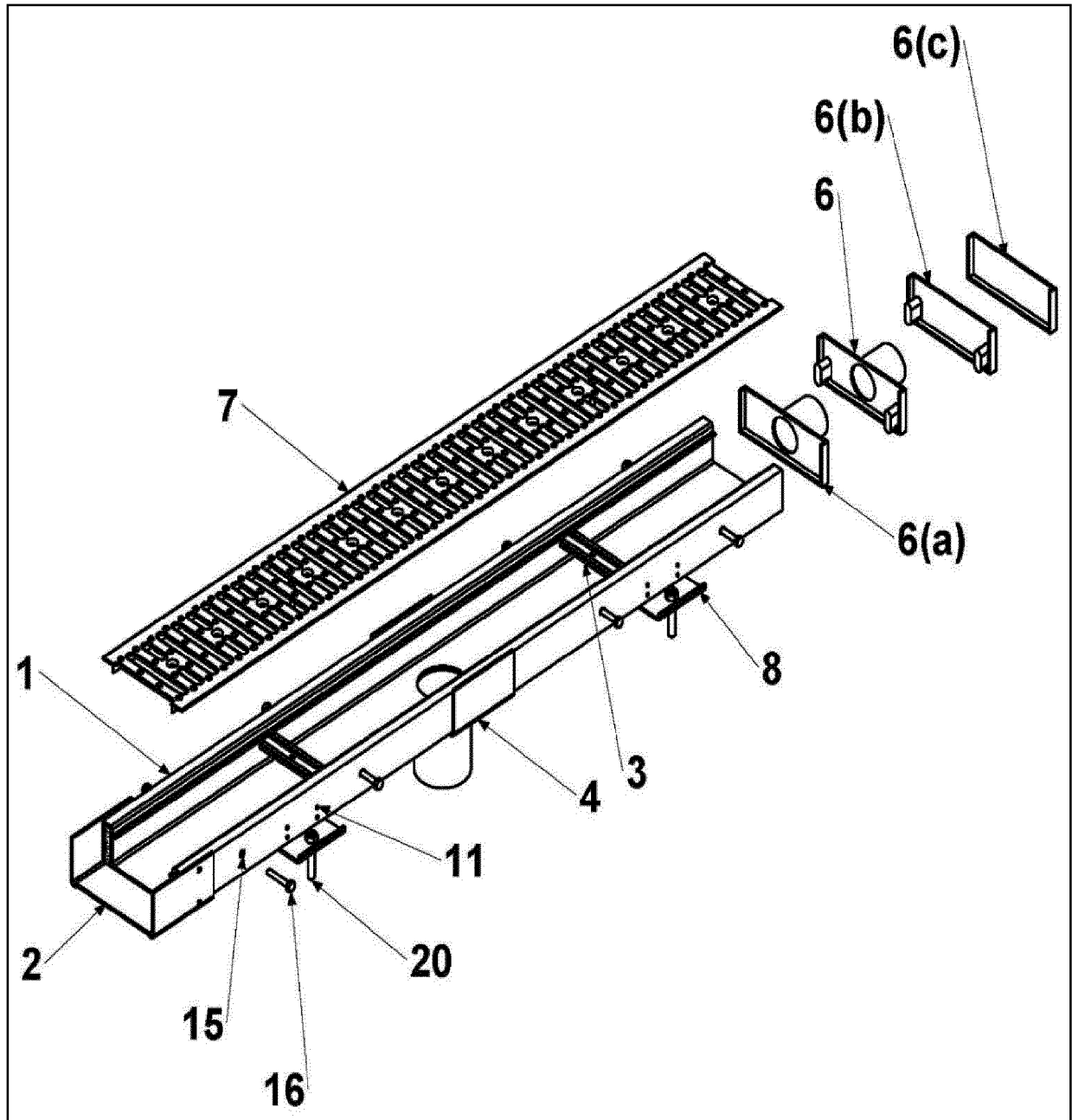


FIG.1

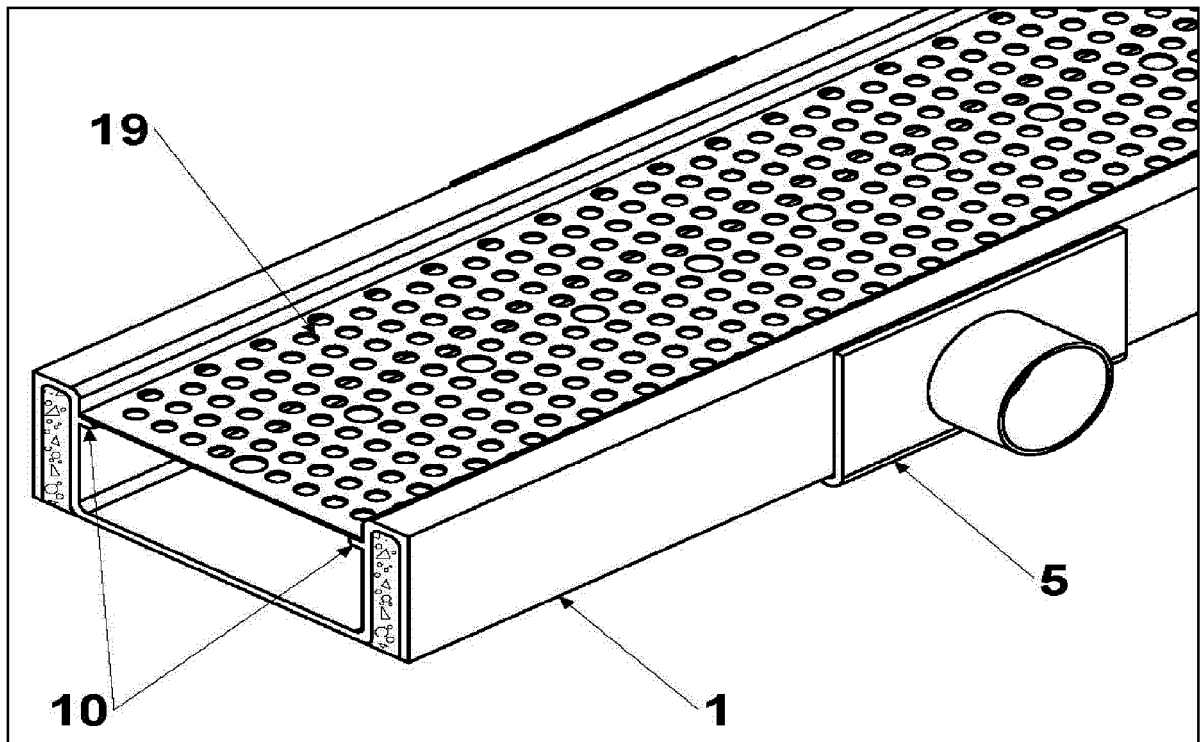


FIG. 2

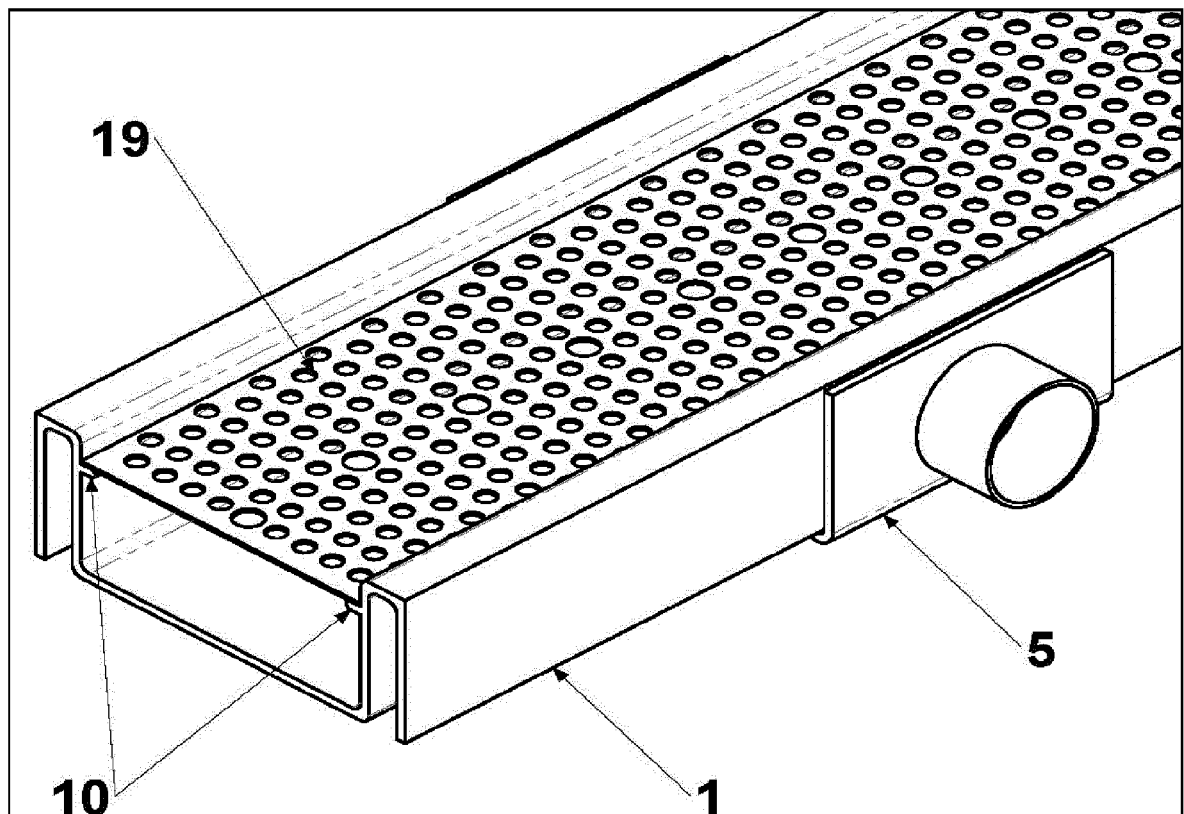


FIG.2(a)

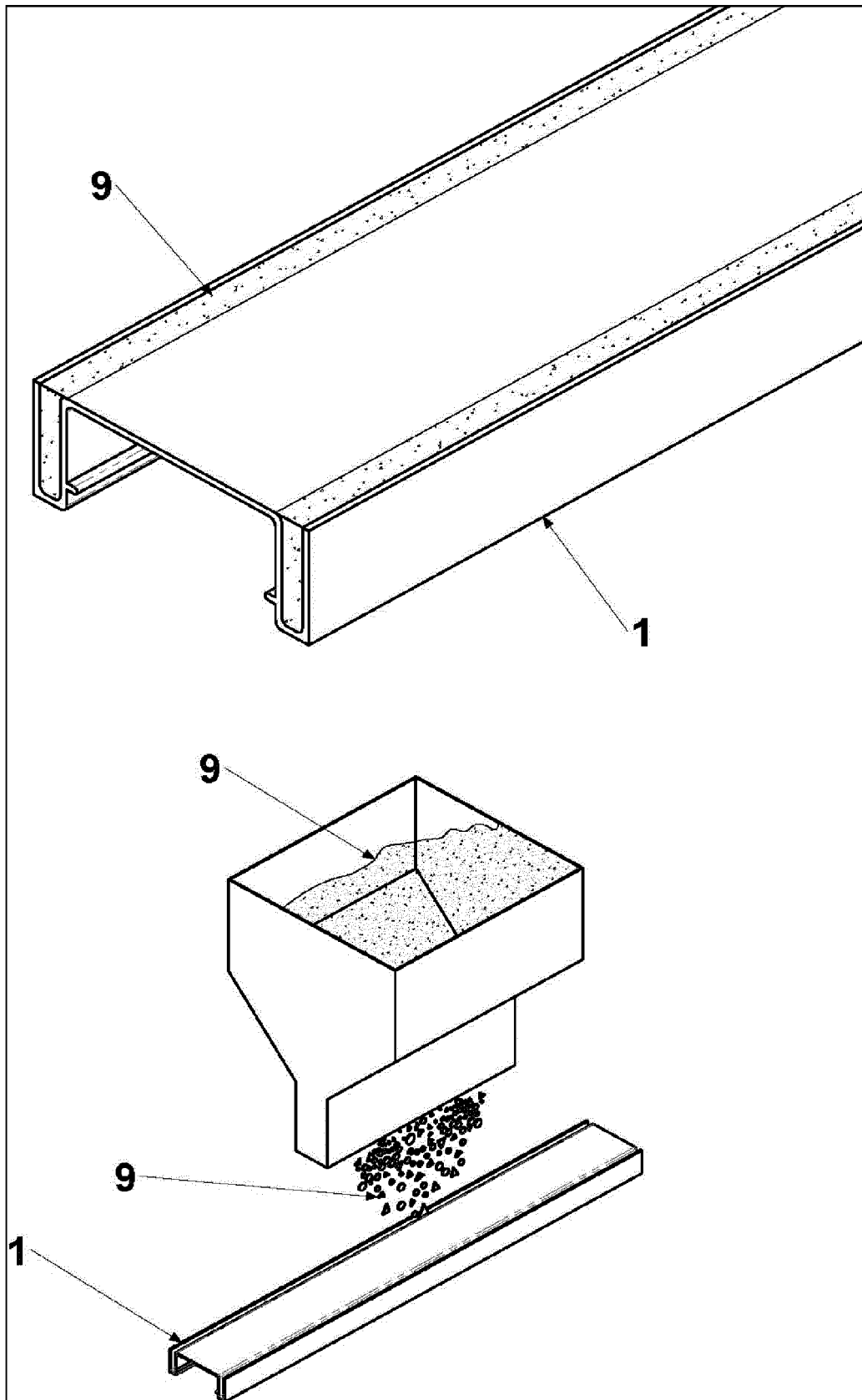


FIG. 3

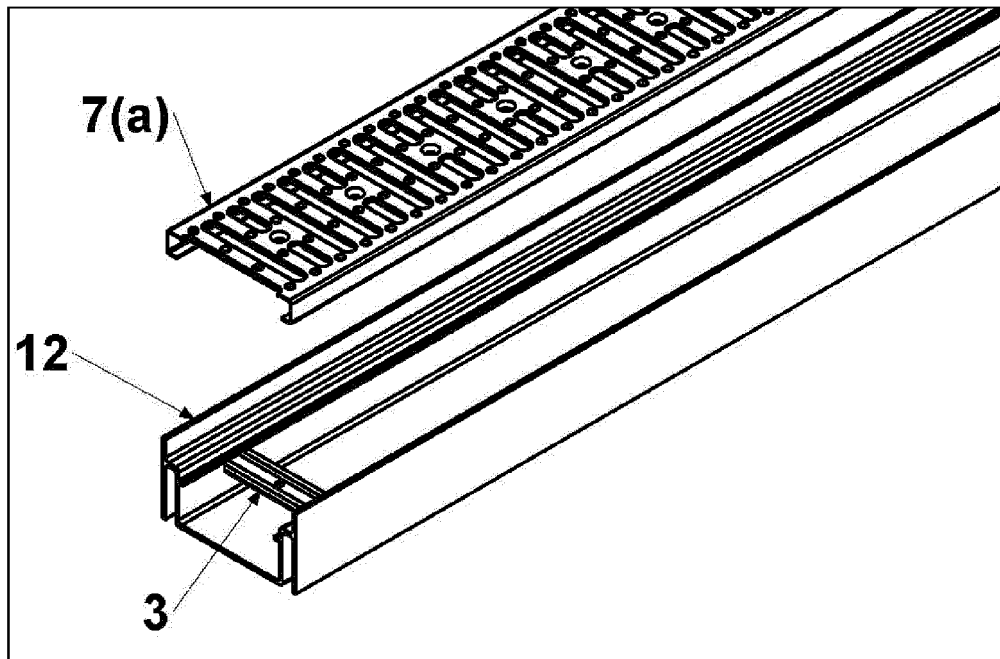


FIG. 4

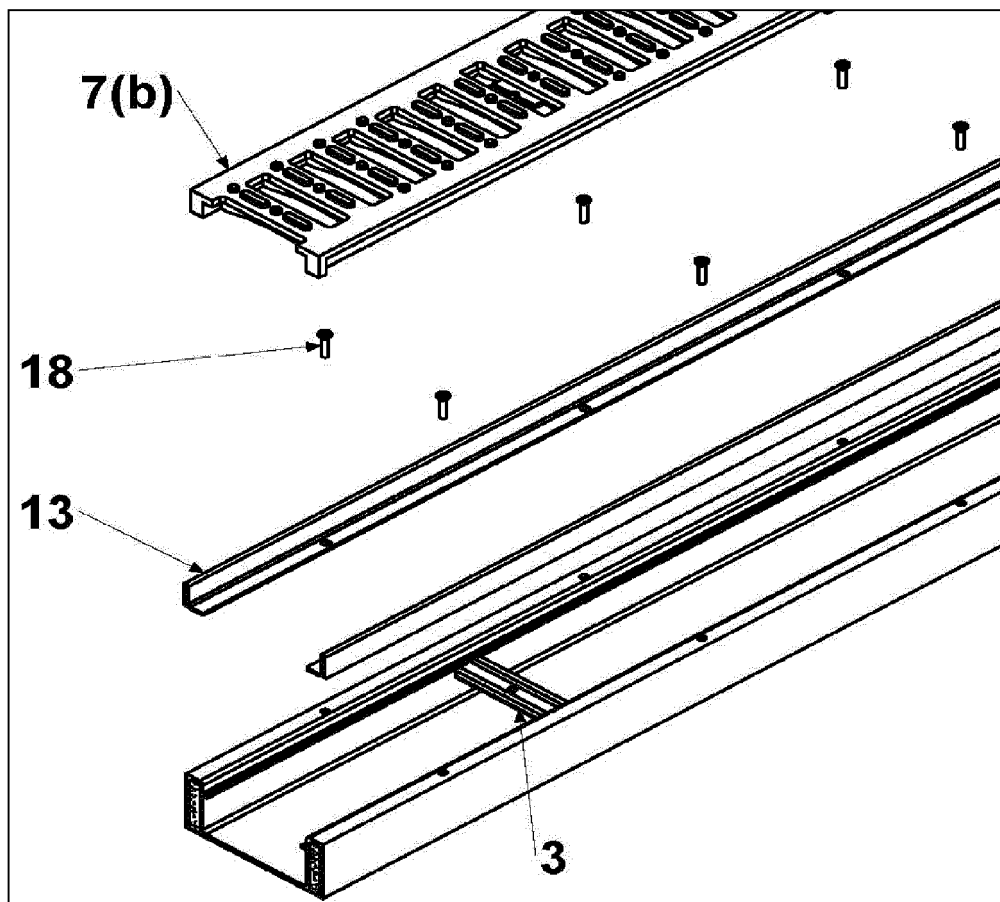


FIG. 4(a)

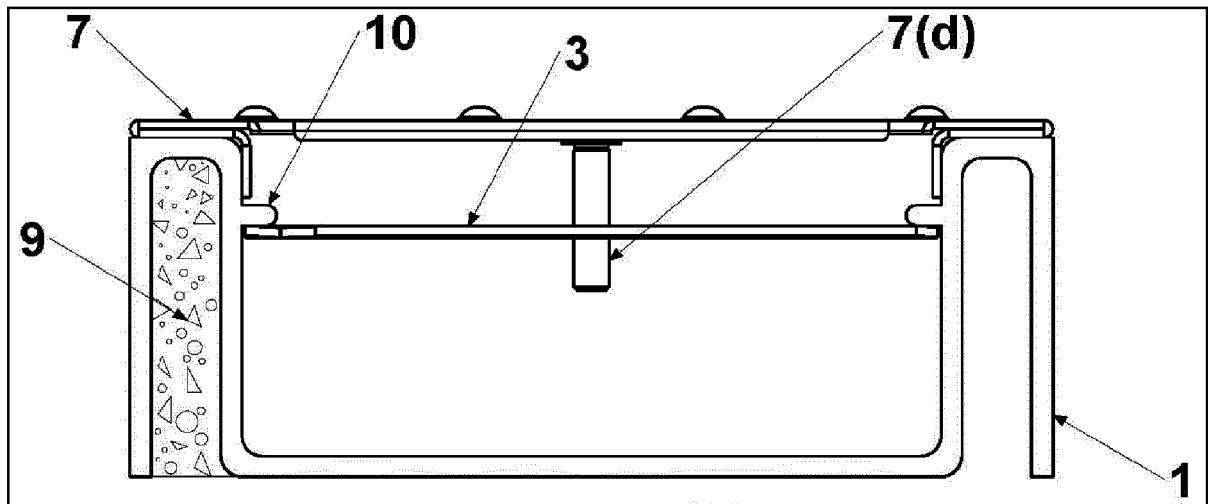


FIG 4(b)

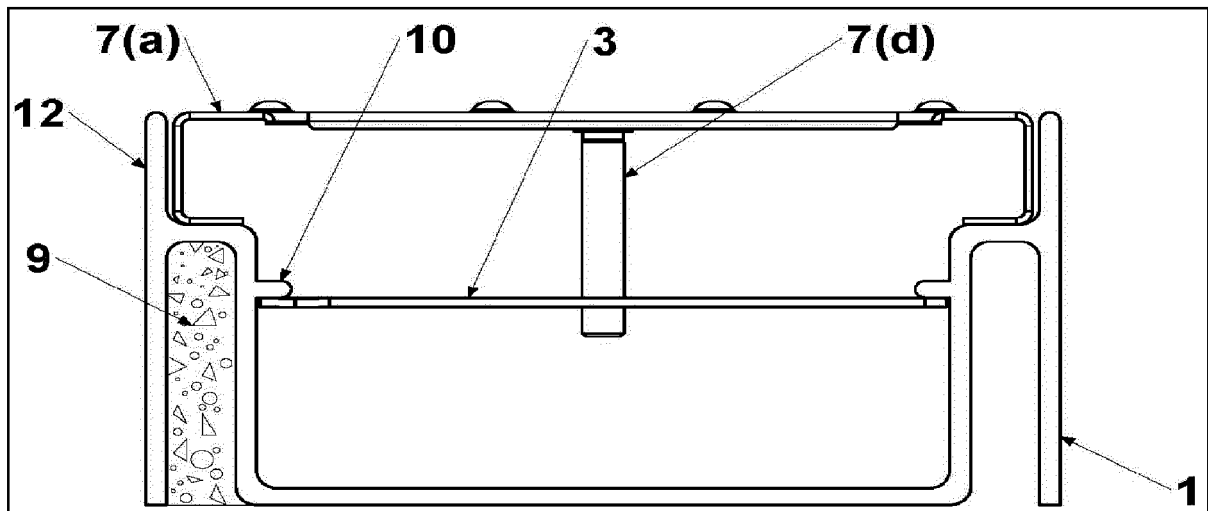


FIG. 4(c)

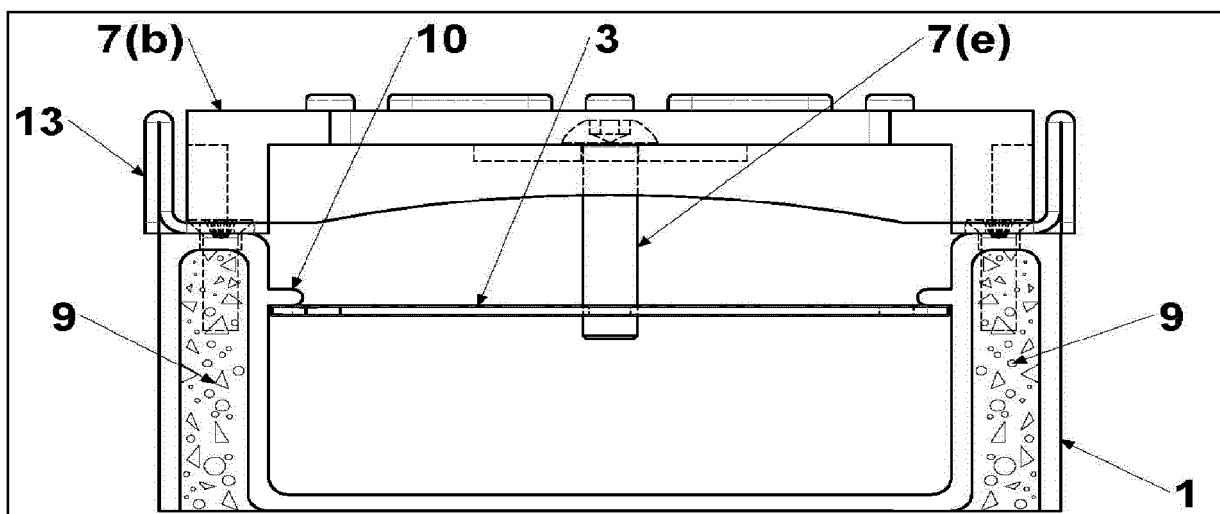


FIG. 4(d)

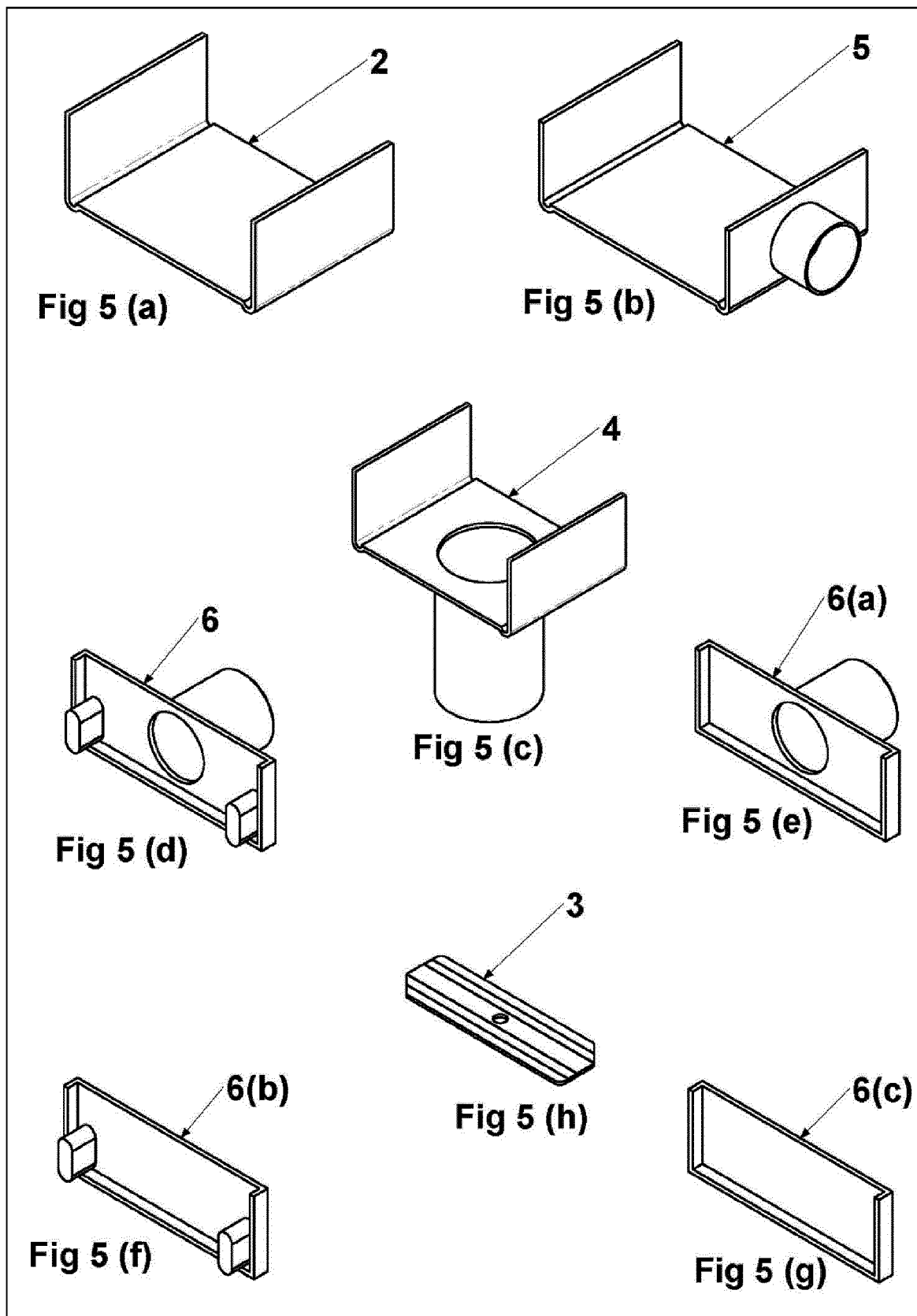


Fig. 5

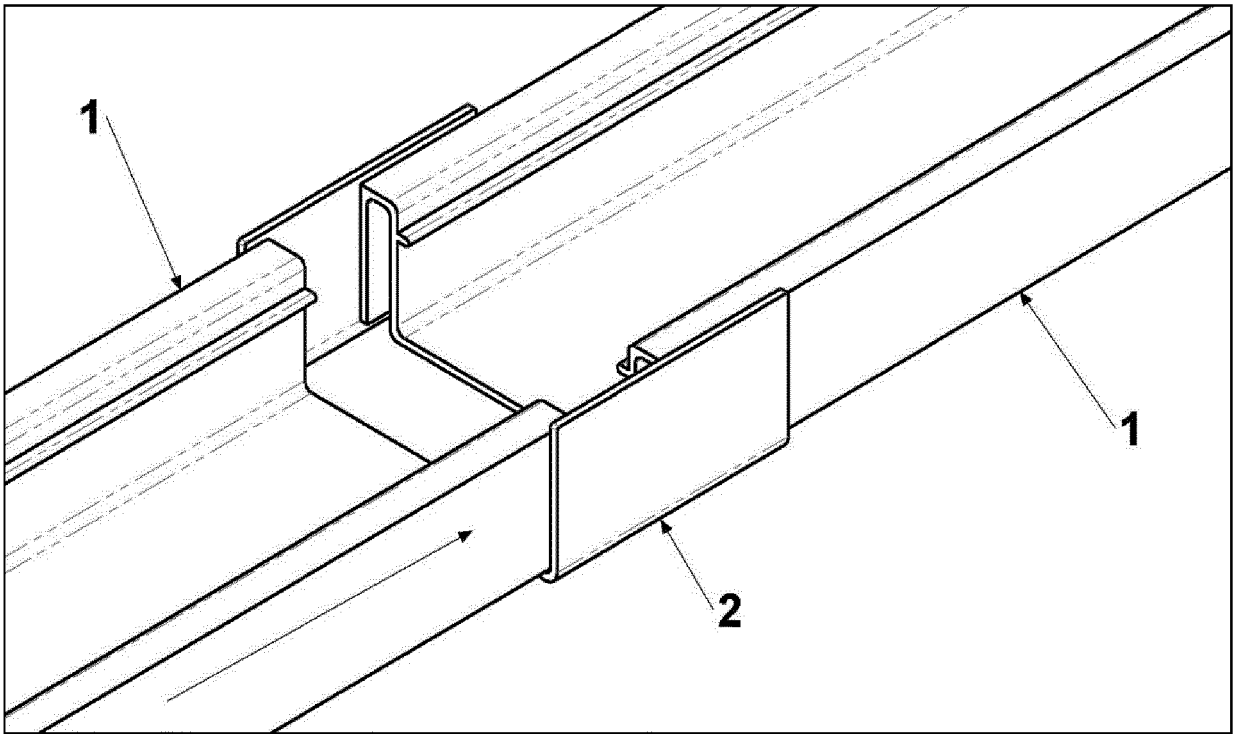


FIG. 6(a)

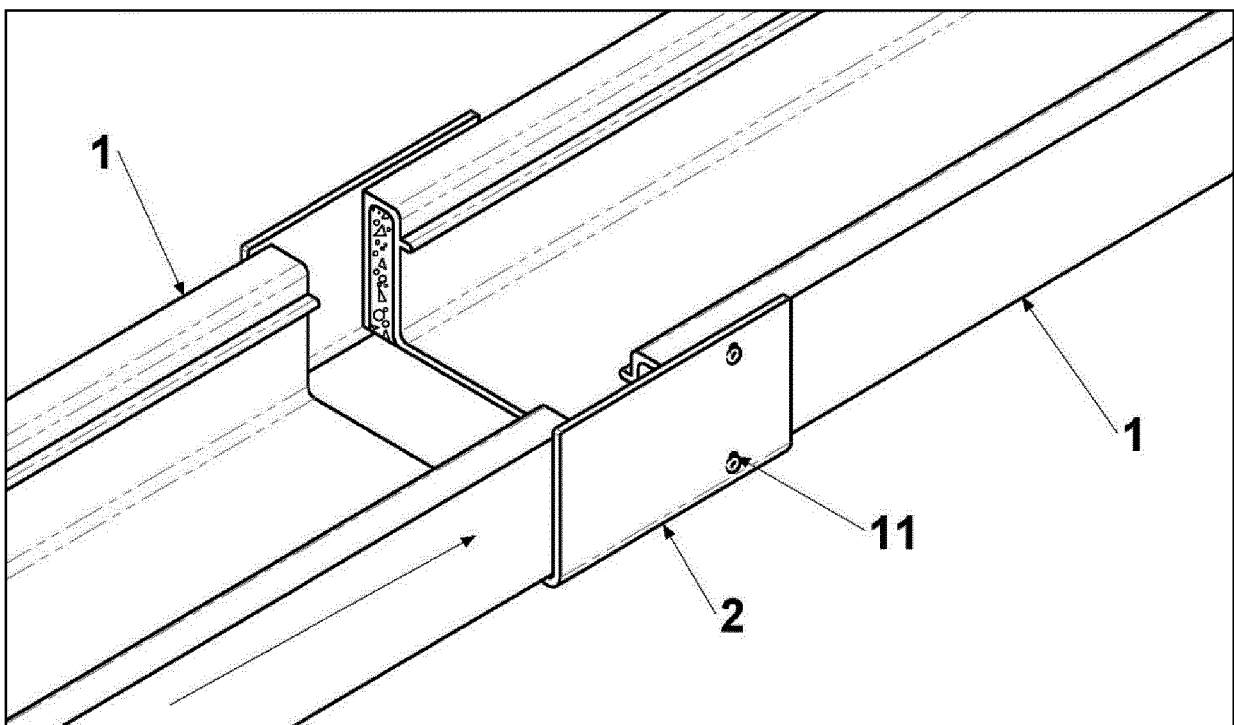


FIG. 6(b)

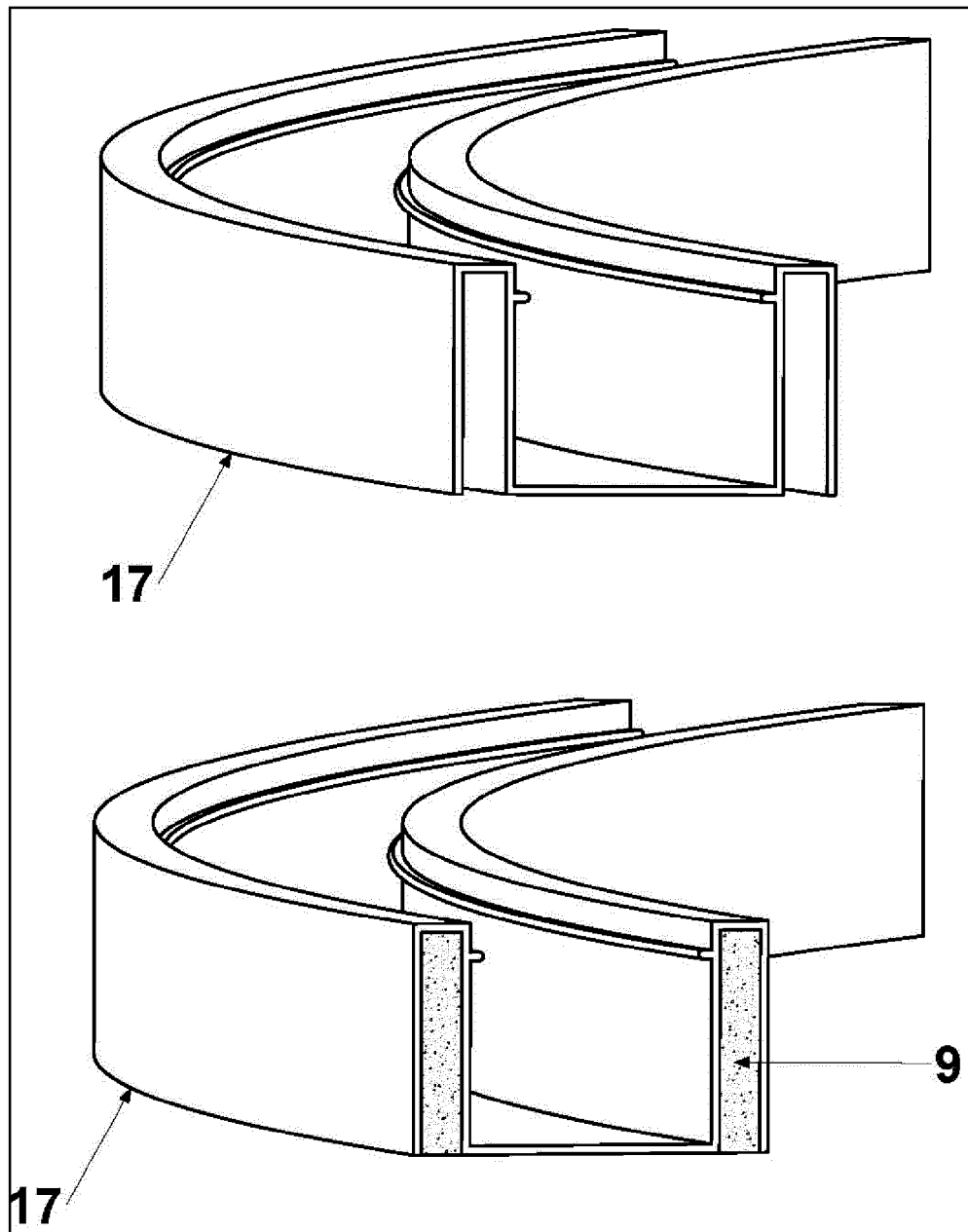


FIG. 7(a)

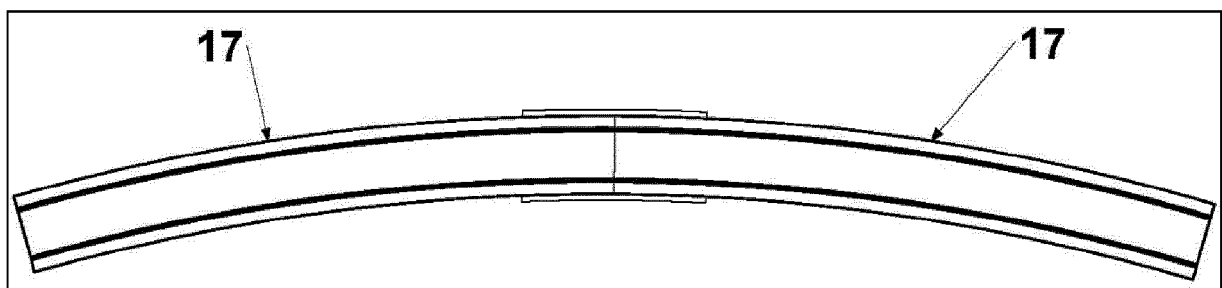


FIG. 7(b)

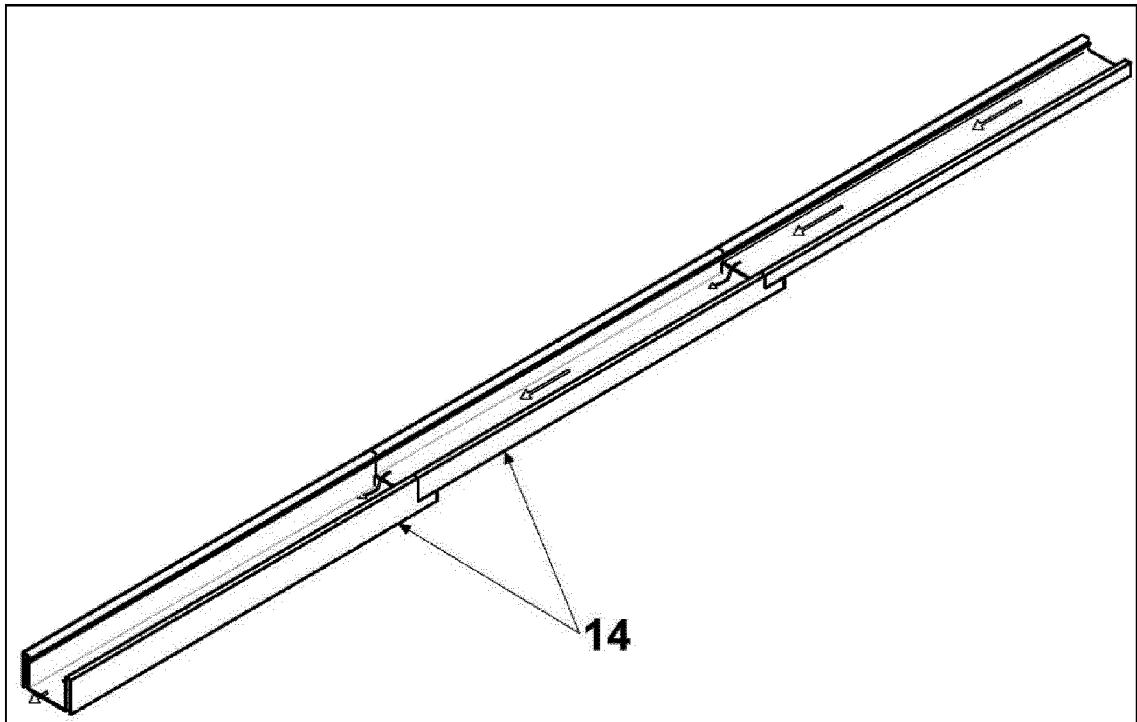


FIG. 8

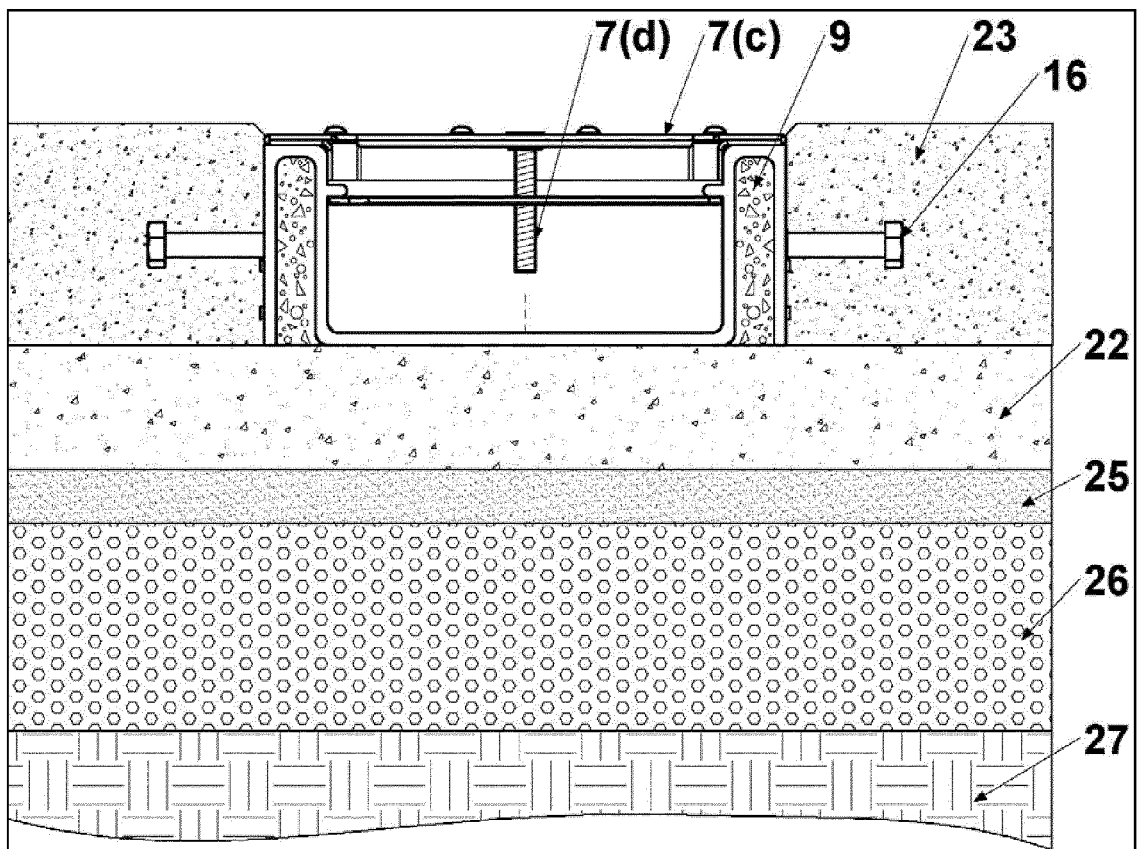


FIG. 9

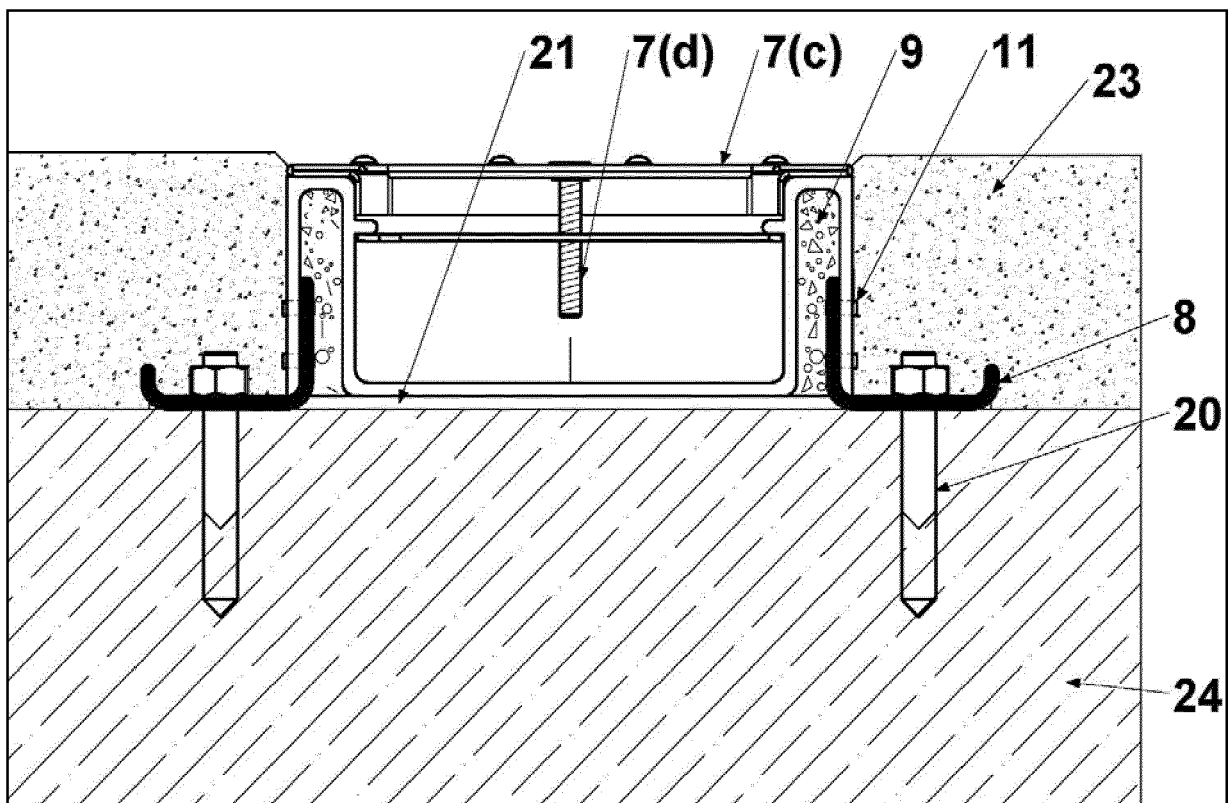


FIG.9 (a)



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