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(54) **A SLOT DRAIN**

(57) A slot drain is disclosed. The drain includes an opening through which water can pass and a channel which leads from the opening to a gully. Support portions extend from the walls which form the channel and support the drainage apparatus on the gully. The width of the gully and the outermost edges of the support portions is much wider than the width of the opening thereby forming a slot drain. A cover is provided which sits in the channel at the opening and the cover has a pattern of apertures formed therein which prevent small objects and parts of items such as stiletto heels from entering or getting stuck in the apertures.

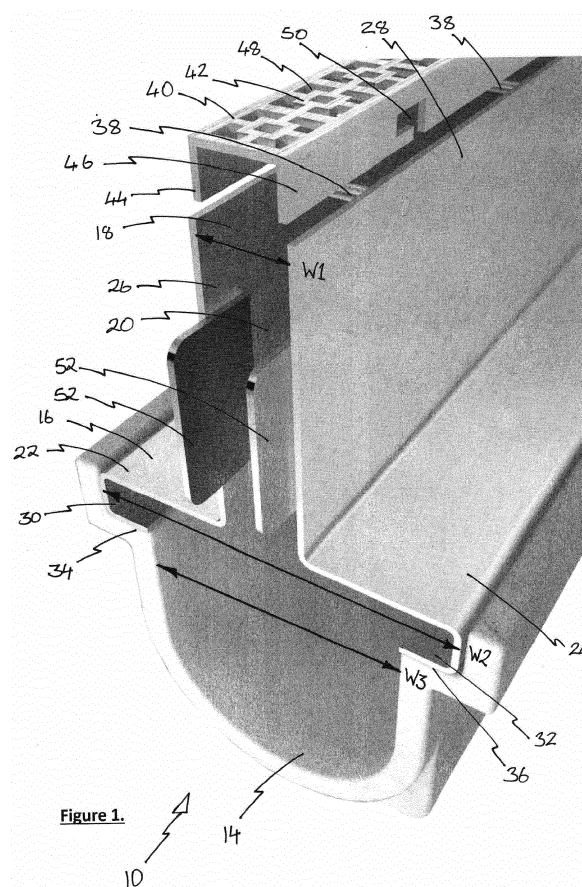


Figure 1.

Description

[0001] The present invention relates to a slot drain, and relates particularly, but not exclusively, to a slot drain for use in outdoor paved areas.

[0002] The use of slot drains is well known. Such drains have a narrow slot which opens up into a larger gully located below the slot. The larger gully is able to hold a significant large volume of water which is an accumulation of the volume of water passing through the narrow slot on the ground surface. Such slot drains are regarded as aesthetically desirable as they allow the paving or other ground surface to extend as far as possible with the maximum ground coverage and minimal ground surface given up to drainage. Slot drains fall into two categories, that is, those with a single slot and those with double slots. Single slot drains are bounded by the two sides of the slot which are generally separated by 12 to 15 mm. Dual slot drains are provided with an additional blade of material extending along the length of the drain down the middle parallel to the sides. The overall width of the dual slot drain is larger than a single slot although the two slots themselves are generally between 10 and 12 mm.

[0003] However, such slot drains have significant disadvantages. Firstly, both the single and dual slot drains are prone to becoming blocked by thin items entering the drains through the slots. For example, cigarette butts, slivers of plastic and small pieces of sheet material can easily enter the slot either becoming stuck in the slot or passing into the drain and accumulating to block the gully. Furthermore, the narrow nature of the slots makes the removal of trapped items extremely difficult and cleaning can only be achieved using pressure washing. Even though the dual slot drain can receive significantly greater volumes of water, both the dual and single slot drains are very difficult to clean.

[0004] A further problem with such slot drains is that the gap of up to 15 mm is large enough to receive items such as stiletto heels. If such a heel enters a slot drain the shoe typically becomes unexpectedly stuck often resulting in injury to the wearer.

[0005] A still further problem with slot drains is that in order to maximise the volume of water that can flow into the drainage gully the support across the two sides of the slot drain is minimised thereby keeping the slot as open as possible. However, this has the disadvantage of weakening the uppermost edges of the drain allowing them to become distorted and damaged during installation and use.

[0006] Preferred embodiments of the present invention seek to overcome or alleviate the above described disadvantages of the prior art.

[0007] According to an aspect of the present invention there is provided a section of a drainage apparatus, which together with like sections form a slot drain, the section comprising:-

an opening, in use at an uppermost end of the drain-

age section and through which liquid can pass;

a channel, formed from a pair of channel sides, connecting said opening to a gully thereby allowing liquid to pass from said opening to the gully, upper ends of said channel sides adjacent said opening separated by a first width;

support portions for supporting the section of drainage apparatus on the gully and having a second width, measured between outermost edges of said support portion parallel to said first width, greater than said first width thereby allowing the channel to drain to a larger gully; and

a cover for covering said opening, said cover having a plurality of apertures formed therein.

[0008] By providing a slot drain, which drains to a gully that is significantly wider than the opening to the drain, with a cover containing a plurality of apertures, significant advantages are provided. For example, the sizes of the apertures can be easily controlled by varying the pattern of the holes thus limiting the size of articles which can enter the drain. This not only assists in preventing the drain from becoming blocked but the holes can be sized to ensure that articles such as stiletto heels cannot become caught in the drain. As a result, drains need to be cleaned less often and ankle and foot injuries are much less likely than with drains of the prior art.

[0009] Furthermore, the cover is inevitably formed perpendicular to the channel sides and as a result acts to brace the channel sides along the entire length of the slot drain. As a result, during installation and use of the drain any forces applied perpendicular to the channel sides are resisted by the cover which is parallel to this direction of force. The consequence of this is that the channel sides are much less likely to be damaged, particularly pressed together, which therefore provides a more pleasing visual finish to the drain and does not alter the flow characteristics of the drain opening. It is also the case that the apertures in the cover can be formed in an aesthetically pleasing arrangement thereby further enhancing the visual impact of the drain within the floor or ground surface.

[0010] In a preferred embodiment the opening, channel and support portions together form a body and said cover is separable from said body.

[0011] By forming the cover separately from the body of the slot drain the advantages provided that the cover can be formed such that it can be removed. This in turn provides easier access for maintenance and cleaning of the slot and in particular the gully. Furthermore, the cover can be wider than the slots of the prior art, as the perforations in the cover determine the flow of water into the drain. As a result, the access to the gully through the slot, once the cover is been removed, is much easier than in traditional slot drains of the prior art, thereby making the process of cleaning the drain and the gully significantly

easier. For example, the gap between the channel sides can be large enough for the head of a pressure washer to be inserted right into the gully.

[0012] In another preferred embodiment the opening comprises the uppermost edges of said channel sides.

[0013] The section of drainage apparatus may further comprise bracing members extending between said channel sides.

[0014] By providing bracing members in the channel sides the advantages provided that these act to strengthen and brace the sides of the channel during installation. Furthermore, the bracing members act to support the removable cover ensuring that it remains in the correct position.

[0015] The cover may further comprise a substantially U-shaped cross-section with an upper surface having said aperture is cut therein and cover sides extending substantially perpendicular therefrom, in use said cover sides engaging said bracing members.

[0016] A cover having a U-shaped cross-section provides the advantage that this removable cover can provide bracing strength across the channel and the cover sides help prevent accidental movement of the cover.

[0017] In a preferred embodiment the cover sides further comprising L-shaped slots cut therein and said bracing members engaging distal ends of said slots.

[0018] By including L-shaped slots in the cover sides and engaging these with the bracing members the advantage is provided that the slots can act to lock the cover in place once installed ensuring that it cannot be easily removed.

[0019] In another preferred embodiment the opening, channel, support portions and cover are formed as a single unit.

[0020] In a further preferred embodiment the opening, channel, support portions and cover are formed from a sheet material suitably folded and with said aperture is cut in said cover.

[0021] The section of drainage apparatus may further comprise at least one gully for receiving liquid from said channel and engaging said support portions.

[0022] The support portions may be substantially the same size thereby locating said channel in the centre of said second width.

[0023] Alternatively the support portions are different sizes thereby locating said channel towards one side of said second width.

[0024] Preferred embodiments of the present invention will now be described, by way of example only, and not in any limitative sense with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a drainage apparatus including a gully of a first embodiment of the present invention;

Figure 2 is a perspective view of a drainage apparatus including a gully of a second embodiment of

the present invention;

Figure 3 is a perspective view of the section of a drainage apparatus excluding the gully of figure 2;

Figure 4 is a side view of the section of drainage apparatus of figure 3;

Figures 5, 6, 7 and 8 are perspective and side views showing the steps for assembling the drainage apparatus of figure 3;

Figures 9, 10, 11 and 12 are perspective views (including two close-up partial views, figures 10 and 12) showing a further component used in the assembly of a slot drain of the present invention; and

Figures 13, 14, 15 and 16 are plan views of covers used in the present invention showing alternative patterns of apertures formed therein.

[0025] Referring to the figures, a drainage apparatus, in the form of slot drain 10 is formed from a series of sections of drain 12. In each of the figures only a single section 12 is shown and the sections are joined end to end to form the slot drain 10 in a manner which is familiar to person skilled in this art.

[0026] In the embodiments shown in figures 1 and 2 the drain is shown including a gully 14. In these examples this gully 14 is a preformed component on which the remainder of the section 12 of the drainage apparatus 10 sits and is installed during the groundworks in the preparation of the ground surface. However, the gully 14 may not be supplied and can be formed by hand from for example concrete during the groundworks.

[0027] Along with the gully 14, the remainder of the drainage apparatus is formed from a metal material, preferably stainless steel. This includes a body portion 16 which is formed having an opening 18, a channel 20 and support portions 22 and 24. The opening 18 is the space at the uppermost end of the channel 20 which is itself defined by a pair of channel sides or walls 26 and 28. In the example shown in the figures, these channel walls extend vertically downwards and this is preferable when the ground covering into which the slot drain 10 is being installed is a paving material such as paving slabs or bricks. Extending from the bottom of the channel 20, that is, from the end opposing the opening 18, are the support portions 22 and 24. In the embodiment shown in figure 1 these support portions 22 and 24 extend perpendicular from the channel walls 26 and 28 and are ended by U-shaped feet portions 30 and 32 which engage respective lips 34 and 36 formed in the gully 14. As can be seen in figure 1 the body is formed in two halves with one side wall 26 and support portion 22 forming one half and the other formed by sidewall 28 and support portion 24. In this example the two halves of the body are mirror images of each other and a formed by cutting a longer length of

the folded sheet material in half and turning one half so formed around to create that mirror-image. The halves are joined together using bracing members 38 which extend between the channel walls 26 and 28 perpendicular to the walls just below the opening 18.

[0028] It is clear from the figures, and from the description above, that the drainage apparatus falls into the category of a slot drain since the size of the opening 18 into which the water initially runs at ground level is significantly narrower than the gully 14 which carries the accumulating volume of water. This is illustrated in the figures in which it shows that the width W1 of the opening 18, measured perpendicular to the length of the section 12 of the drainage apparatus 10, is significantly smaller than the width W2 measured across the support portions 22 and 24. Specifically, the width W2 is measured from the outermost edges of the U-shaped feet portions 30 and 32 of the support portions 22 and 24. It is also worth noting that the width W1 is smaller than the width W3 measured across the gully 14.

[0029] Formed separately from the body portion 16 is a cover 40 which fits into the opening 18 such that the uppermost surface 42 of the cover 40 is at approximately the same height as the opening 18, that is at the uppermost ends of the walls 26 and 28. The upper surface 42 of cover 40 can sit slightly above or slightly below the upper edges of the walls 26 and 28 whilst still performing its function of covering the opening 18. The cover 40 is formed with a U-shaped cross-section and therefore cover walls 44 and 46 extend from the upper surface 42 perpendicular to that surface and in use downwards into the channel 20. A series of apertures 48 are cut into the uppermost surface 42 of cover 40 and it is through these apertures that water from the ground surface can drain via the opening 18, through the channel 20 and into the gully 14. Figures 13, 14, 15 and 16 illustrate some particularly aesthetically pleasing examples of patterns of apertures which can be cut into the cover 40. Other patterns can of course be used but it is desirable to ensure that the dimensions of the apertures 48 are sufficiently small so that only liquids and small items can pass through or into the apertures and articles such as the letter heels cannot enter and get caught in the apertures. Typically each aperture has a dimensions less than the width W1.

[0030] Cut into the cover walls 44 and 46 are pairs of L-shaped slots 50 with one of each of the pairs of slots on each wall and a pair of slots 50 provided for each bracing member 38 in the body portion 16. The L-shaped slots 50 are provided to lock the cover 40 into engagement with the body portion 16 by locating the bracing members 38 in the distal ends of the L-shaped slots 50 thereby preventing upward movement of the cover 40.

[0031] It should be noted that in figures 2 to 12 the support portions 22 and 24 are different sizes thereby making the body asymmetric. This embodiment is used particularly where the drainage is to be installed immediately adjacent the edge of a building or some other

structure into which the gully 14 cannot extend. In these examples the support portion 24 is extended and the support portion 22 shrunk so that it only includes the foot portion 30 which extends directly from and perpendicular to the channel wall 26.

[0032] Operation of the apparatus 10 set out above will now be described with particular reference to figures 5, 6, 7 and 8. During the preparation of the ground for laying a ground surface, such as paving, tarmac or the like, a gully 14 is placed into the ground (or alternatively formed into the ground) at a height such that when sections of drainage apparatus 12 are placed onto the gully the opening 18 will be at substantially the same height, that is substantially flush with, the uppermost ground surface of the paving, tarmac or the like. Further gullies 14 are aligned together to create a drainage channel generally leading to a main drain.

[0033] Next the body portion 16 is placed onto the gully 14 without the cover 40 in place. Further body portion 16 are then aligned with the first body portion and on top of the further gullies. A pair of tabs 52 which are attached to and extend from the inner surfaces of the channel walls 26 and 28 slot into the opposing end of the next body portion 16 to maintain the correct alignment of the body portions. The remainder of the ground surface is formed up to the body portion and any debris from the construction is cleaned from the inner surfaces of the channel walls 26 and 28.

[0034] The cover 40 is then put into place by inserting it into opening 18 with the open ends of L-shaped slots 50 aligned with the bracing members 38. Figures 5 and 6 show the cover 40 prior to engagement with the body portion 16 in perspective and side views. Figure 7 shows the cover 40 engaged with the body portion 16 and part of the channel wall 28 is shown as if removed to demonstrate the bracing member 38 in initial engagement with the corner of L-shaped slots 50. In figure 7 it is clear that the cover 50 extends beyond the end of the body 16 (left-hand edge as shown in figure 6) when in this initial engagement. In order to complete the instalment of the cover 40 it is pushed to the right (as seen in figure 6) so that the bracing member 38 engages the distal end of the L-shaped slot 50. It should be noted from figures 7 and 8 that when the cover 40 is in place the uppermost surface 42 lies slightly below the uppermost edges of the channel walls 26 and 28 which define the opening 18. For removal of the cover 40 the above process is reversed.

[0035] When the cover 40 is in place it provides additional strengthening support to the body portion 16. The bracing members 38 already prevent the movement of the channel walls 26 and 28 towards each other. However, it is possible that in the spaces between the bracing members 38 that the channel walls adjacent the opening 18 could become bent. When the cover 40 is in place this provides support along the entire length of the walls and prevents any movement or bending of the upper edges of the channel walls 26 and 28.

[0036] In order to ensure that the covers 40 cannot

easily be removed a final locking drainage section is installed. Structurally this final section is very similar to those previously described but include slight differences. The final section and its installation is illustrated in figures 9 to 12 and components in these figures which are equivalent to those in figures 1 to 8 are labelled with like reference numerals increased by 100. The body portion 116 appears almost identical to the body portion 16 previously described except for the addition of a tab connector 154 which joins the two tabs 152 together and has a threaded aperture 156 formed therein. Likewise the cover 140 is very similar in construction to the cover 40 as previously described except that the cover walls 44 and 46 have been removed below the height of the L-shaped slots 50. In other words the cover walls 144 and 146 of cover 140 are shorter than the cover walls 44 and 46 of cover 40. The other change which distinguishes the cover 140 is the inclusion of a tab 158 which extends from the bottom end of wall 144 and is parallel to the upper surface 142 of cover 140.

[0037] Because the cover 140 does not have the L-shaped slots 50 it can be installed vertically and no space to the left-hand side is required to accommodate the movement of the slots 50 onto the bracing members 38. In other words, the tab 158 can descend and engage the tab connector 154 and a bolt 160 can pass through an aperture in tab 158 and into the threaded aperture 156 thereby locking the cover 140 onto the body portion 116. As a result, the final body portion 116 and final cover 140 can be installed against an end surface such as a wall. When this last piece is in place and fixed by bolt 160 it will prevent the adjacent drainage section 12 from having its cover 40 moved to the left and separated from the body portion 16. This in turn prevents removal of the next cover 40 and all of the cover portions 40 are locked in place to their respective body portion 16.

[0038] It will be appreciated by persons skilled in the art that above embodiments have been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departing from the scope of the invention as defined by the appended claims. For example, the body portion and gully can be formed as a single item, preferably all from sheet material folded such that the support portions connect to the gully by a bend in the sheet material. As a further alternative the body portion 16 could be made as a single component without a removable cover 40. In this instance the body portion 16 would be formed by cutting the apertures 48 into a strip of sheet metal and then this sheet is bent to form the upper surface 42, the channel 20 and the support portions 22 and 24. The opening 18 would then be defined as the apertures 48 in the upper surface 42.

Claims

1. A section of a drainage apparatus, which together

with like sections form a slot drain, the section comprising:-

an opening, in use at an uppermost end of the drainage section and through which liquid can pass;
a channel, formed from a pair of channel sides, connecting said opening to a gully thereby allowing liquid to pass from said opening to the gully, upper ends of said channel sides adjacent said opening separated by a first width;
support portions for supporting the section of drainage apparatus on the gully and having a second width, measured between outermost edges of said support portion parallel to said first width, greater than said first width thereby allowing the channel to drain to a larger gully; and
a cover for covering said opening, said cover having a plurality of apertures formed therein.

2. A section of drainage apparatus according to claim 1, wherein said opening, said channel and said support portions together form a body and said cover is separable from said body.

3. A section of drainage apparatus according to claim 2, wherein said opening comprises the uppermost edges of said channel sides.

4. A section of drainage apparatus according to claim 2 or 3, further comprising bracing members extending between said channel sides.

5. A section of drainage apparatus according to claim 4, wherein said cover comprises a substantially U-shaped cross-section with an upper surface having said aperture is cut therein and cover sides extending substantially perpendicular therefrom, in use said cover sides engaging said bracing members.

6. A section of drainage apparatus according to claim 5, wherein said cover sides further comprising L-shaped slots cut therein and said bracing members engaging distal ends of said slots.

7. A section of drainage apparatus according to claim 1, wherein said opening, channel, support portions and cover are formed as a single unit.

8. A section of drainage apparatus according to claim 7, wherein said opening, channel, support portions and cover are formed from a sheet material suitably folded and with said aperture is cut in said cover.

9. A section of drainage apparatus according to any of the preceding claims, further comprising at least one gully for receiving liquid from said channel and engaging said support portions.

10. A section of drainage apparatus according to any of the preceding claims, wherein said support portions are substantially the same size thereby locating said channel in the centre of said second width.

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11. A section of drainage apparatus according to any of claims 1 to 9, wherein said support portions are different sizes thereby locating said channel towards one side of said second width.

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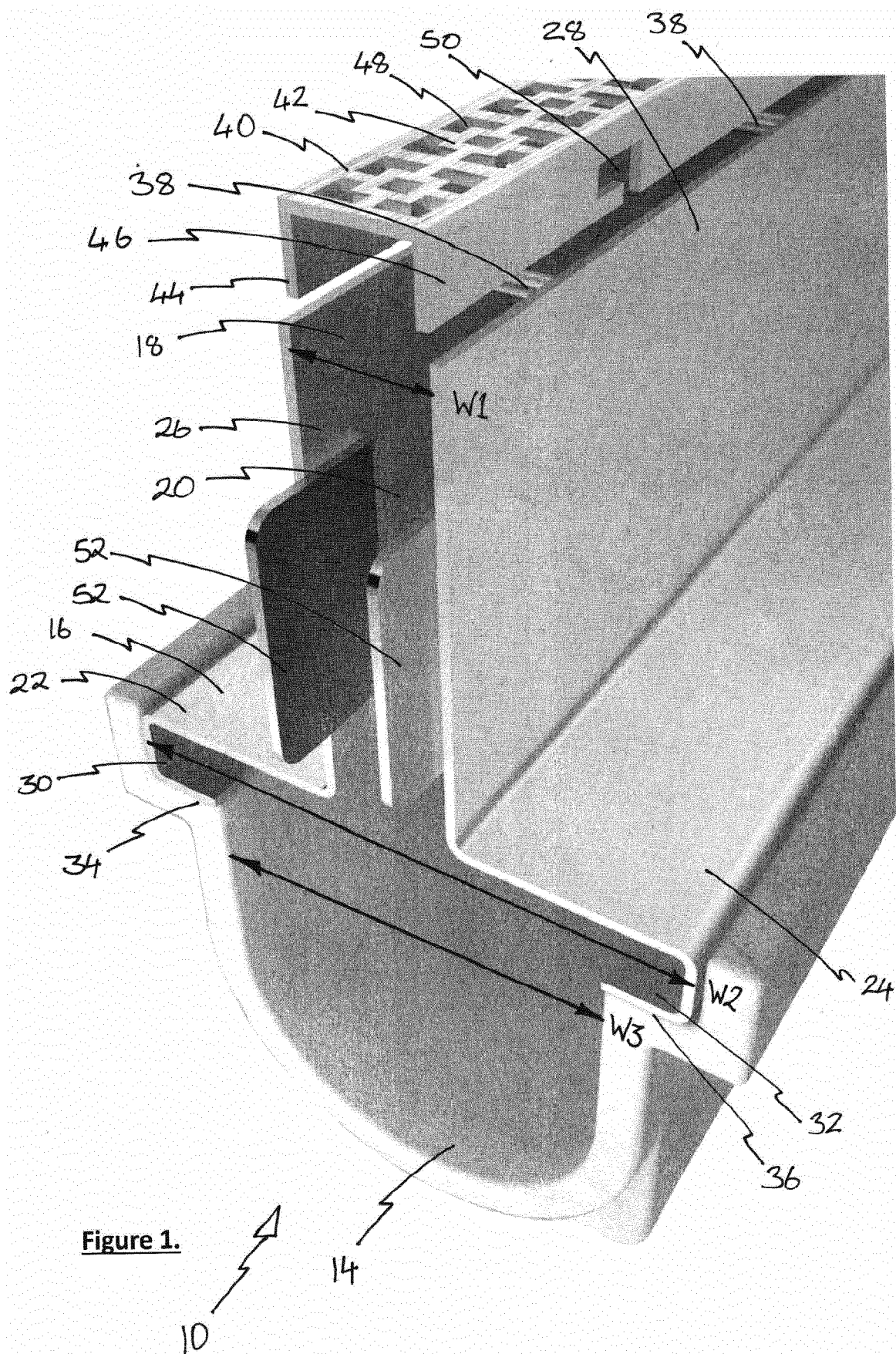
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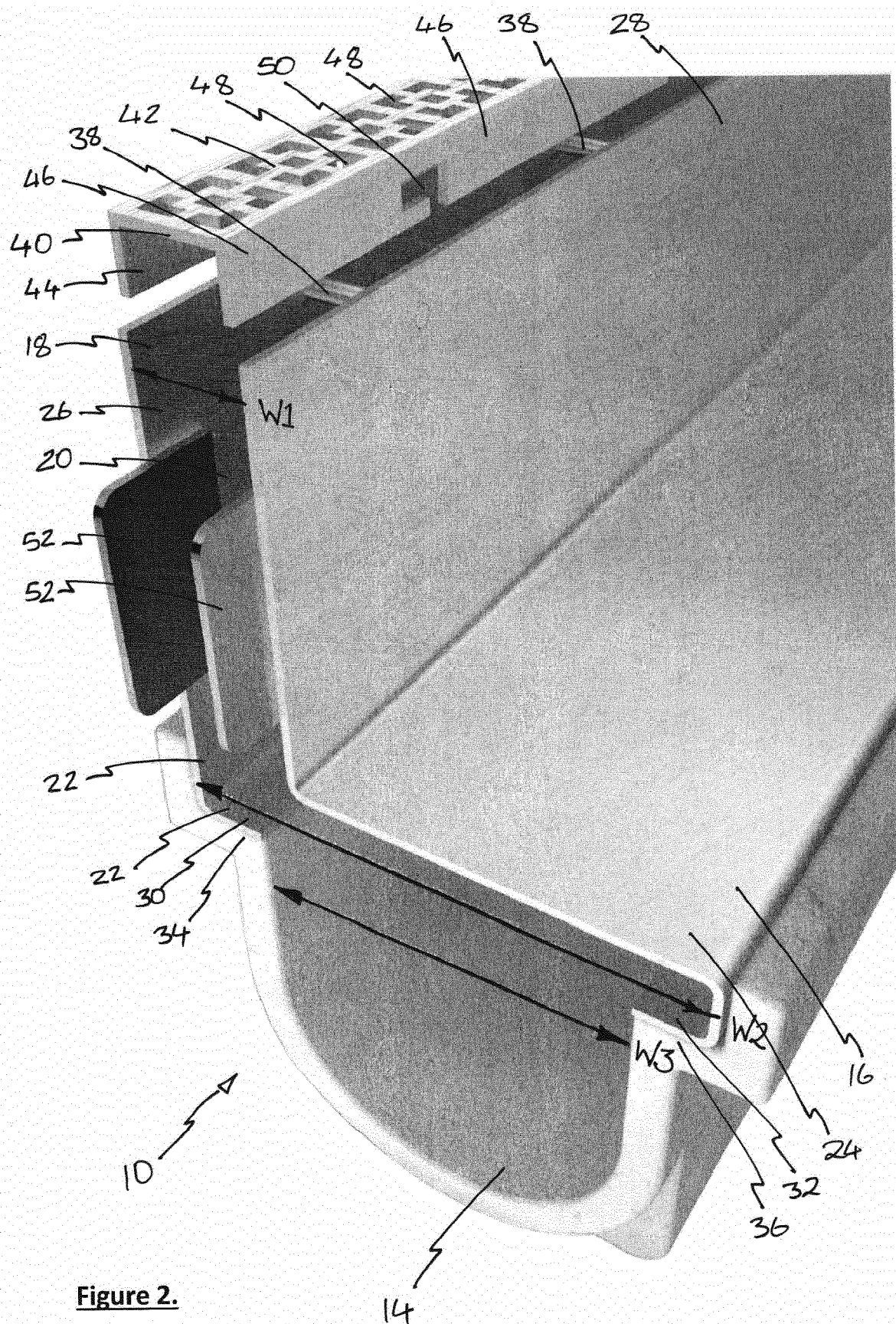
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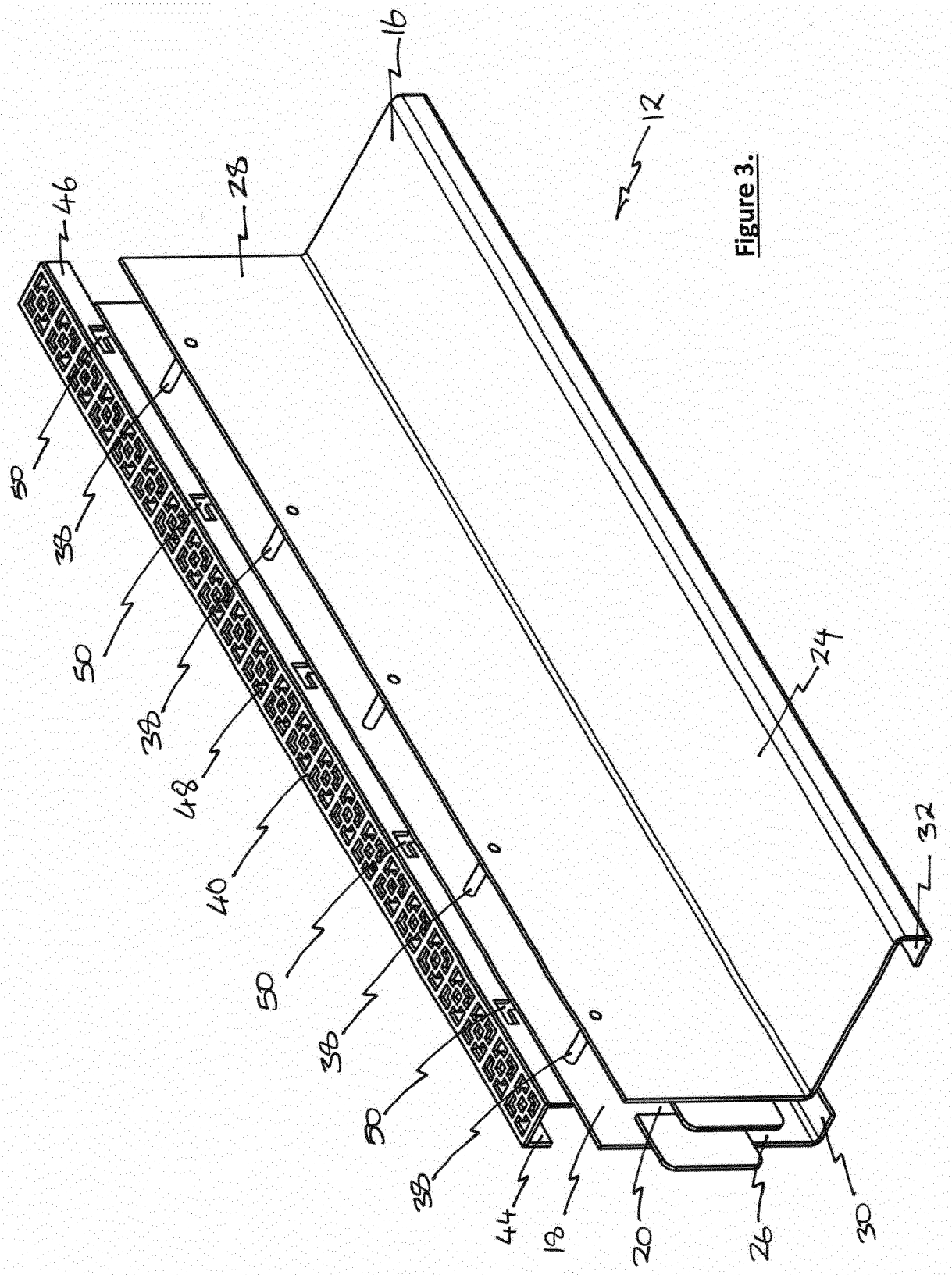
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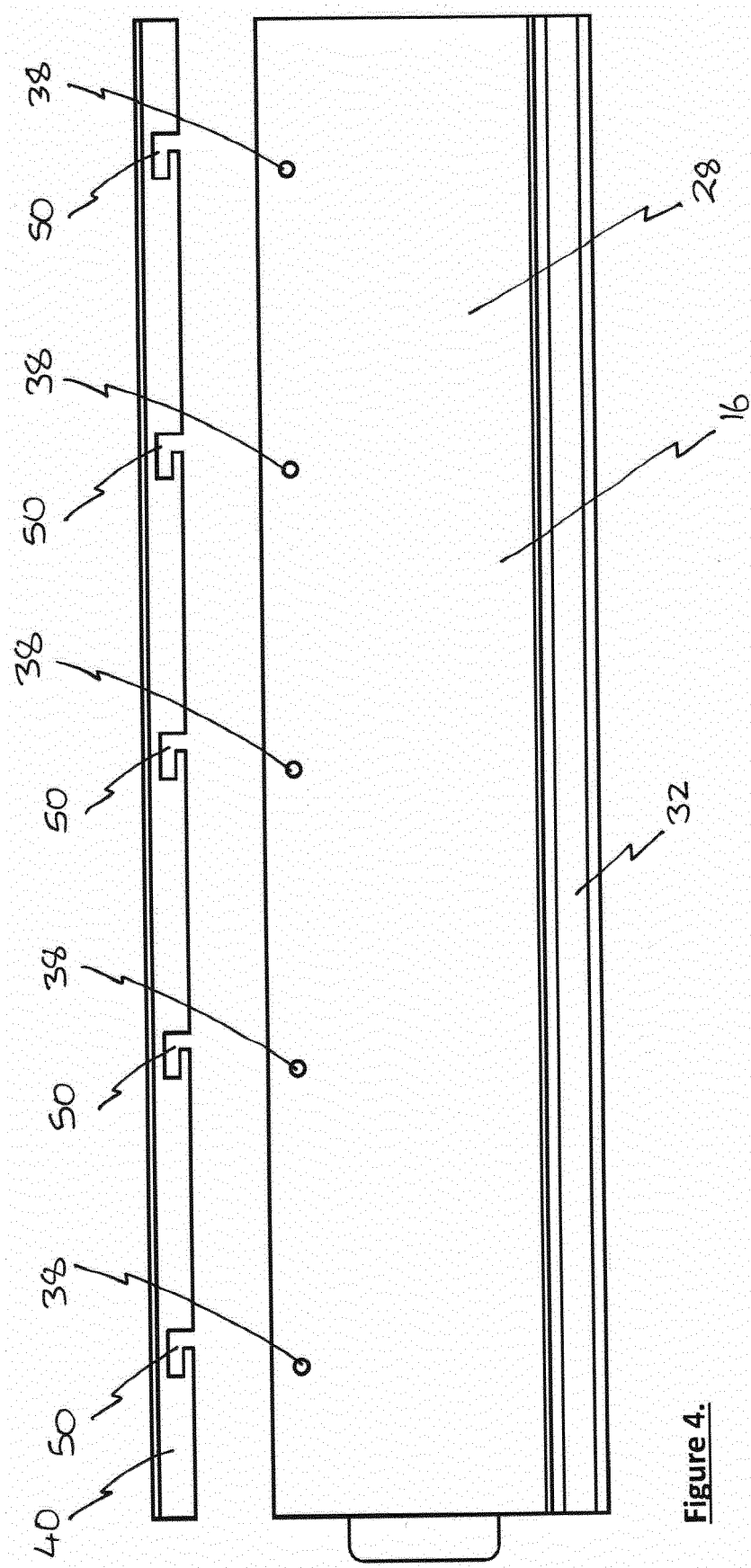


Figure 4.

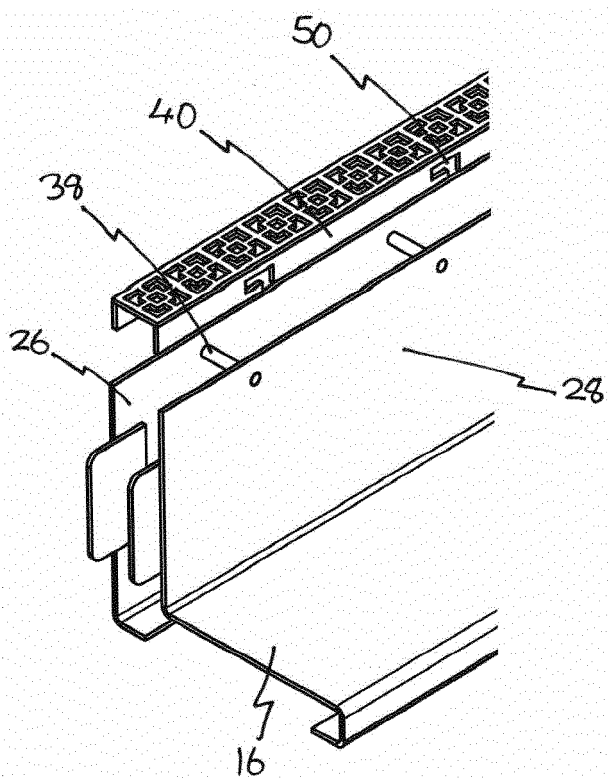


Figure 5.

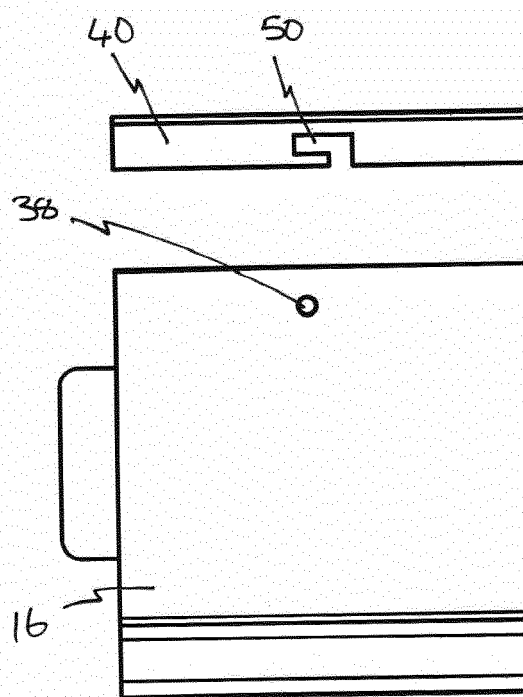


Figure 6.

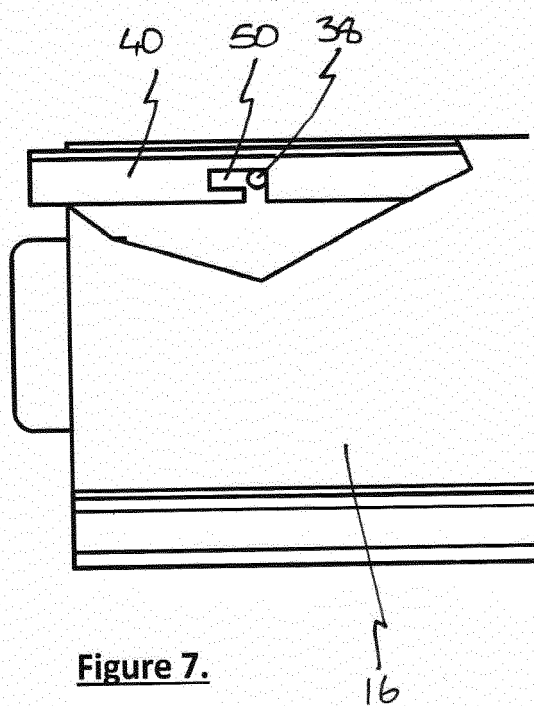


Figure 7.

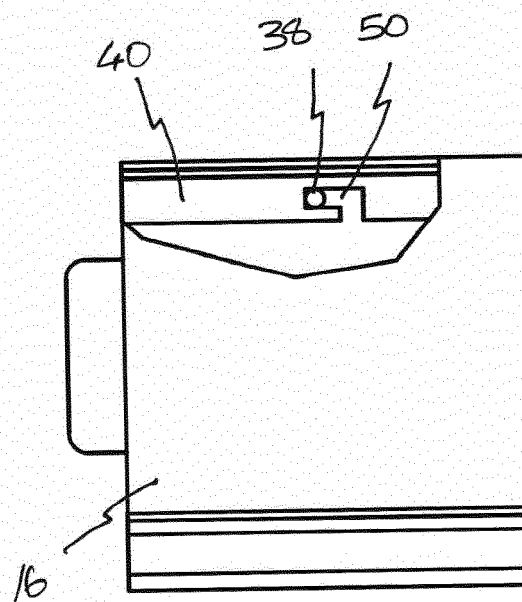


Figure 8.

Figure 10.

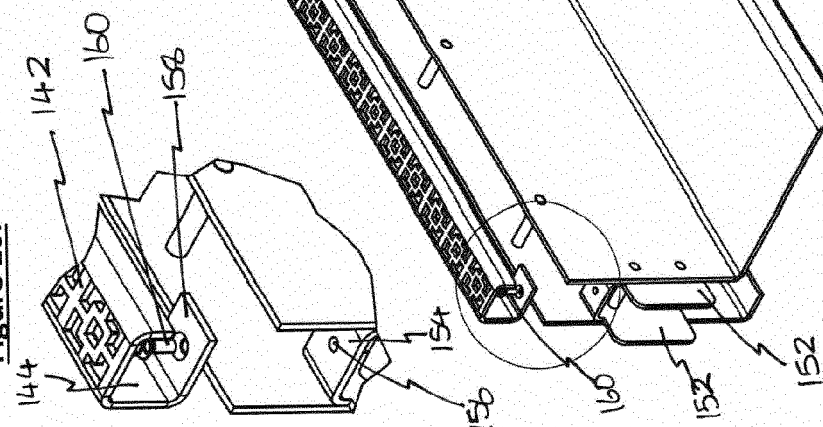


Figure 9.

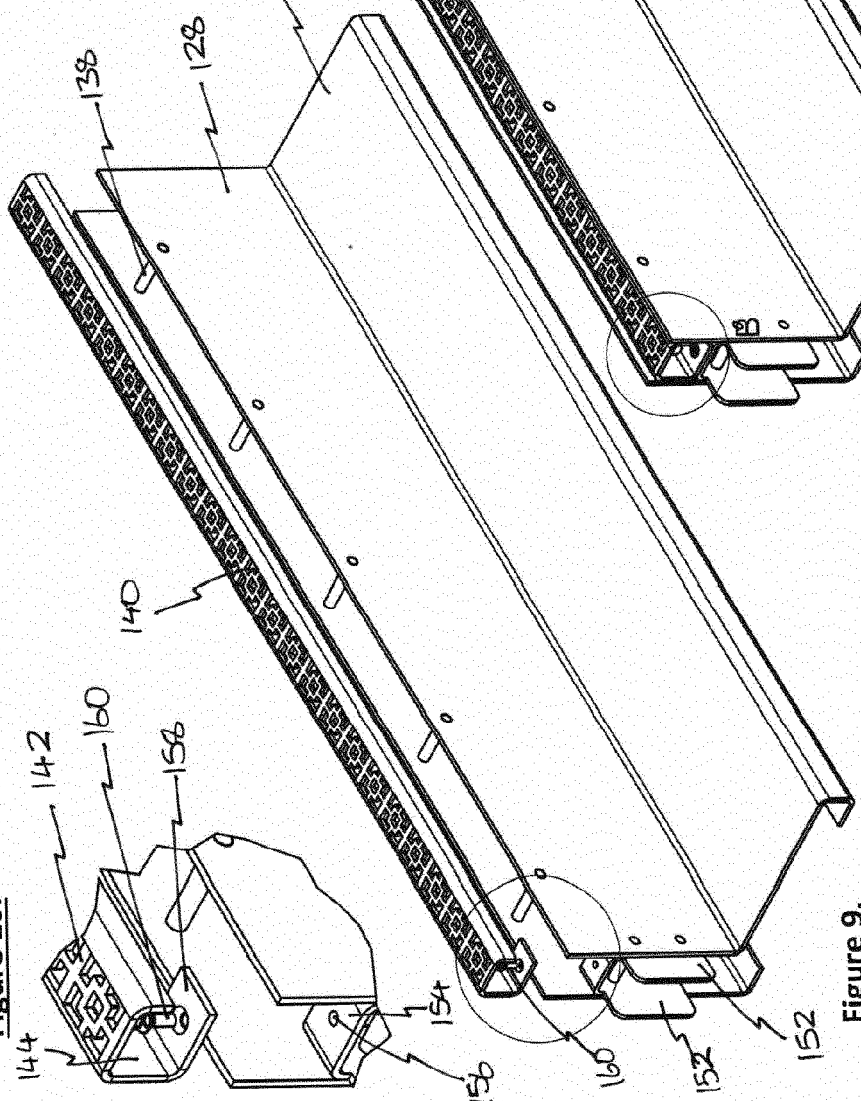


Figure 11.

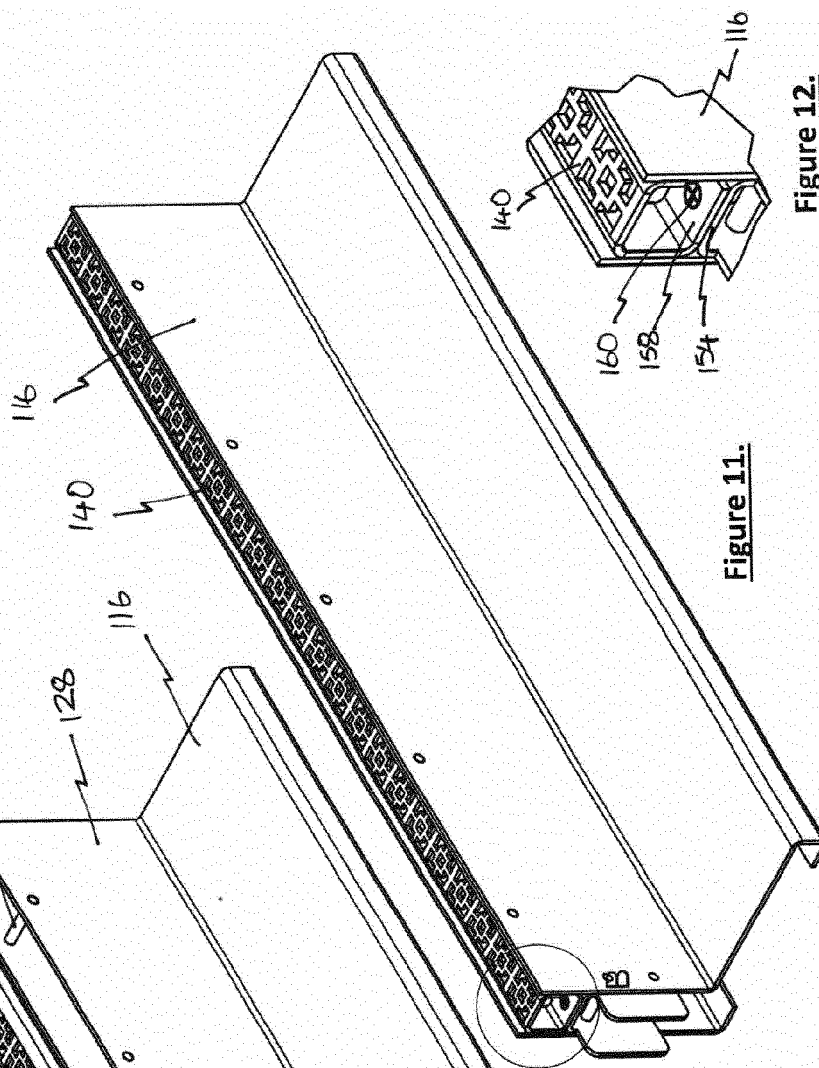


Figure 12.

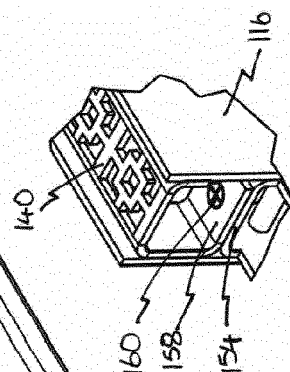


Figure 13.

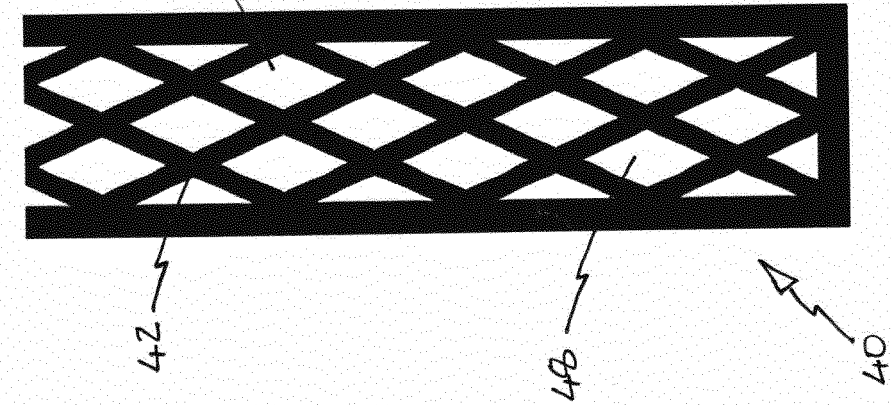


Figure 14.

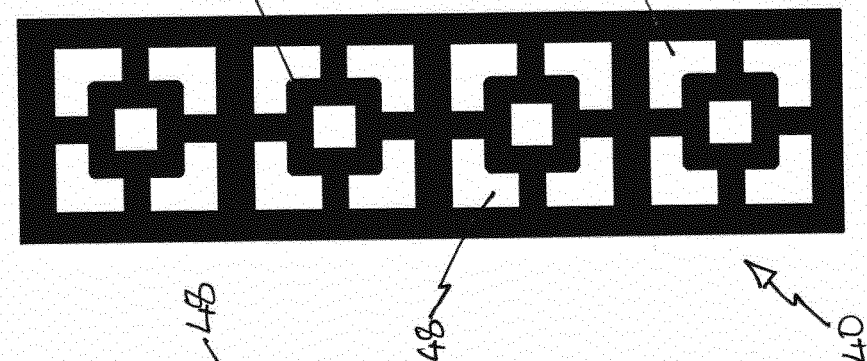


Figure 15.

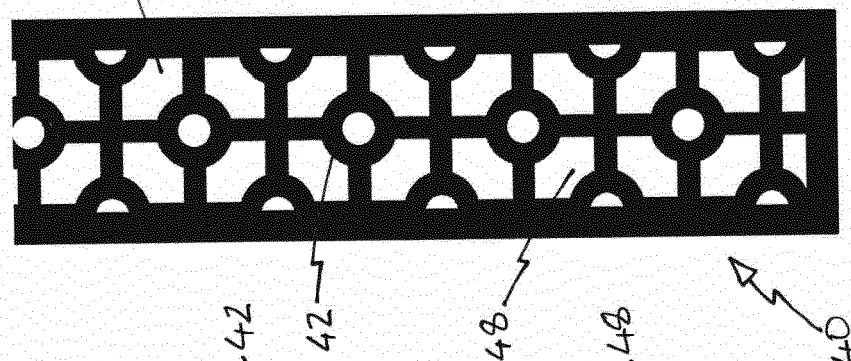
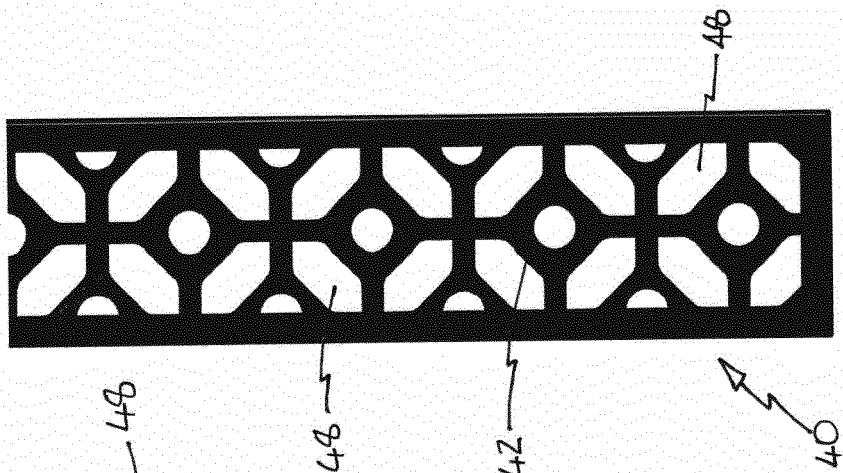


Figure 16.





EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 March 2018	Examiner Beucher, Stefan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 20 1916

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The members are as contained in the European Patent Office EDP file on
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