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(54) **RAILWAY PLATFORM COPING UNIT WITH RECESSED UNDERSIDE**

(57) The invention discloses a coping unit suitable for use on a raised platform comprising an under-face incorporating a plurality of regular recesses.

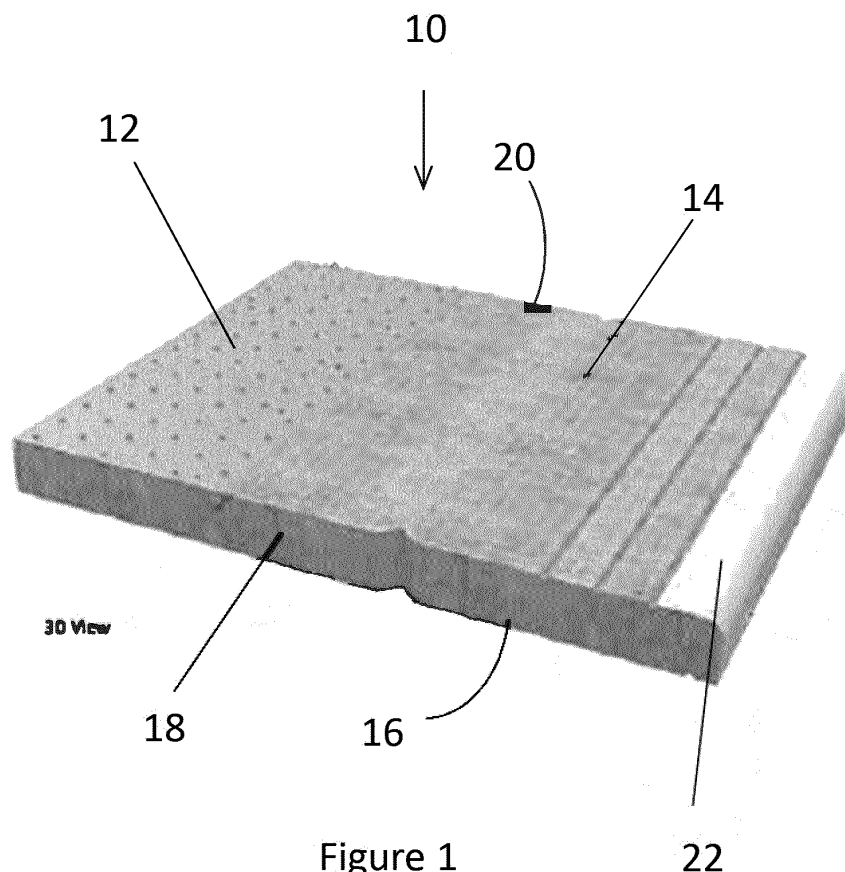


Figure 1

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Description

Field of the Invention

[0001] The invention relates to an improved coping unit and a method of production thereof, the coping unit being suitable for use on raised platforms such as railway platforms.

Background to the Invention

[0002] Raised platforms such as those found at railway stations traditionally incorporate a series of mutually abutting rectangular coping units extending along the outer edge to delineate the platform proximal to the track. The coping units are secured to the platform structure with a cement-based mortar bedding and the front end of a unit partially extends away from the platform to form a projecting lip. The projecting lip acts to at least partially bridge the gap between the platform and the trains.

[0003] Due to their configuration and the potential danger associated with forming a platform edge, coping units such as those described, have a number of physical properties and tolerances that they must meet in order to pass safety regulations.

[0004] In order to meet those requirements, current coping units are heavy concrete slabs. As a result of their size and weight, such units are costly to transport and difficult to lift and install into position. Furthermore, given their mass, the current units are reliant on a substantial substructure and without this the units can settle and move around leading to sloping and joints opening up between units. This can create lips and ridges which form a trip hazard and require regular maintenance, further increasing the associated costs.

[0005] Furthermore, the configuration of current concrete slabs makes the attachment to the platforms weak when subjected to lateral shear forces. This makes the units more susceptible to the lateral movement associated with settlement.

[0006] The current invention seeks to at least partially overcome the above limitations, providing a lighter weight coping unit that retains the longevity of a current concrete unit but is much easier to transport and install, and is less susceptible to movement.

Summary of the Invention

[0007] In a first broad independent aspect, the invention provides a coping unit suitable for use on a raised platform comprising an under-face incorporating a plurality of regular, preferably non-continuous recesses. This configuration is highly beneficial because the recesses reduce the volume of material required to manufacture the coping unit and therefore decrease the weight of the coping unit. In addition, the recesses increase the surface area of contact between the coping unit and a bonding adhesive (usually a cement-based

bedding mortar), used to secure the coping unit in position and therefore increase the strength of the attachment. Furthermore, the recesses provide a surface against which the concrete setting within the recesses can abut, reducing the possibility of the coping unit slipping parallel to the surface of the platform. Finally, the recesses provide an area for the bonding adhesive to push into during installation making the coping unit easier to install.

[0008] Preferably, the sides of the recesses are at an angle of between about 15 and 45 degrees. This is beneficial because the angled sides of the recesses assist in releasing the units from the mould, during casting. In addition, the angled sides reduce the possibility of the pinnacles of the sides shearing off, producing a stronger attachment.

[0009] Preferably, the recesses tessellate to form a regular pattern. This is beneficial because the tessellation enables more recesses to be included within a coping unit, and therefore reduces the weight, whilst not impairing the structural strength, of the unit.

[0010] In a second broad independent aspect the invention provides a method of constructing a coping unit suitable for use on a raised platform, the method being characterised by the step of bringing together an initially separate tactile plate and the previously cast body of the unit before the body has fully set. This is highly beneficial because casting the tactile plate directly into the coping unit removes the need to separately affix it. This saves time in manufacture and also removes the possibility of human error and lifetime issues with tactile plate adhesion and maintenance. In addition, by casting the tactile plate into the coping unit you can ensure there is no lip or ridge between the tactile plate and the top of the coping unit, which may be a tripping hazard.

[0011] Optionally but advantageously, the method of the second aspect can be used to produce the coping unit of the first broad independent aspect.

Brief Description of the Drawings

[0012] The invention will now be described with reference to the accompanying drawings which show by way of example only, embodiments of a coping unit. In the drawings:

Figure 1 is a first embodiment of a coping unit in perspective view, and;

Figures 2a, 2b and 2c, are respectively, a bottom view, a cross-sectional end view and a side view of a first embodiment of a coping unit.

Figures 3a, 3b and 3c, are respectively, a top view of a tactile plate, an end view of a tactile plate and a top view of a tactile plate incorporated into a first embodiment of a coping unit.

Detailed Description of the Invention

[0013] With reference to the above figures, the following description provides a detailed understanding of the present invention. The invention discloses a lighter weight coping unit, with bottom surface adapted to incorporate a plurality of regularly arrayed recesses.

[0014] The recesses reduce the volume of concrete and therefore the unit mass (compared to flat bottomed coping units) and also providing greater adhesion (greater surface area and bedding key) therefore improving fixity to the substrate. Furthermore, the decreased weight of the units makes them easier to transport and install and less reliant on the competency of the substrate.

[0015] In the following specification the term coping unit refers to the unit used to delineate the edge of a raised platform such as at railway stations.

[0016] The following description will make reference to the coping unit as formed from a standard concrete aggregate mix such as those known in the art. However, the invention is envisaged to function with a range of concrete mixes to provide variable physical properties as required. For example, the coping unit may be formed of a lightweight or high strength concrete mix to further enhance the features of the coping unit. Furthermore, it should be appreciated that the invention is not limited to concrete and in an embodiment of the invention the coping unit is made from one of slate, granite, marble, sandstone, ceramic, glass, earthenware, rubber, metal or plastics.

[0017] The term tactile plate herein refers to a region of the coping unit with a regular or irregular, pattern of raised or indented relief suitable for providing a tactile or audible indication that a user is near the edge of the raised platform. Such units are required due to statutory and safety regulations and can be integrally formed with the coping unit, in fixed attachment with the unit or independently mounted to the platform.

[0018] When used herein, terms such as 'top', 'bottom', 'front', 'back' and 'sides' are defined with respect to the orientation of the coping unit in use, with the front of the coping unit considered as facing away from the platform.

[0019] Figure 1 shows a first embodiment of a coping unit 10 in perspective view. The coping unit 10 is generally in the form of a substantially rectangular slab, with a planar top 14, a bottom 16 and sides 18 and 20 respectively extending therebetween. At the front of the coping unit 10 a rounded lip 22 curves from the top 14 to the bottom 16, thereby forming an upper edge. In a preferred embodiment, the lip 22 is coated in a coloured paint to improve the lips' visibility and assist users in identifying the edge of the platform. In a further preferred embodiment, the lip 22 is coated in a chlorinated rubber resin paint.

[0020] In the current embodiment, at the back of the coping unit 10 is incorporated a rectangular tactile plate 12. In an embodiment, the tactile plate 12 is formed from a suitable fibre enforced laminate, plastic or hard rubber

material. In a further embodiment, the tactile plate is coated in a rough finishing material to increase the coefficient of friction and reduce the possibility of a person's foot slipping thereon. In an alternative embodiment, the coping unit 10 does not incorporate a tactile plate 12.

[0021] In a preferred embodiment, the coping unit has overall length dimensions of between around 1000mm to 1400mm, of between around 1100mm to around 1300mm, of between about 1150mm to 1200mm. The coping unit has width dimensions of between around 800mm to 1050mm, of between around 850mm to around 1000mm, of between around 900mm to around 950mm. The coping unit has depth dimensions of between around 80mm to around 110mm, of between around 90mm to around 105mm, of between around 95mm to around 100mm. In the embodiment of the coping unit not incorporating a tactile plate, the coping unit has length dimensions of between around 600mm to around 900mm.

[0022] Figures 2a-c show a first embodiment of a coping unit 10 from multiple side views. Figure 2a shows the bottom 16 of the coping unit 10, with the internal structure represented by dashed lines. The bottom 16 incorporates a plurality of recesses 30 tessellating to form a regular pattern. In a preferred embodiment, the coping unit 10 incorporates sixteen recesses 30 in a regular four by four grid. In an alternative embodiment, the coping unit 10 incorporates recesses 30 in one of: a five by five grid pattern, a six by six grid pattern, a three by four grid pattern or a three by five grid pattern.

[0023] In a preferred embodiment, each recess 30 is shaped as a pyramidal frustum, with a square outer edge 32 in the plane of the bottom 16 of the coping unit 10 and a smaller square base 34 at the bottom of the recess 30. In an alternative embodiment, one or both of the outer edge 32 and the base 34 are one of: rectangular, pentagonal, hexagonal, heptagonal or any suitable non-continuous geometric shape.

[0024] The sides 36 of the recess 30, adjoining the outer edge 32 to the base 34 are sloped to form a bevel. In a preferred embodiment, the bevelled sides 36 are between 45 and 15 degrees from vertical. In a further embodiment, the bevelled sides 36 are between 35 and 25 degrees from vertical. In a further embodiment, the sides 36 are bevelled at an angle of 30 degrees. In an embodiment, the base 34 of the recess 30 is centred within the outer edge 32 such that each bevelled side 36 has an identical length and angle of slope. In an alternative embodiment, the base 34 of the recesses 30, is offset within the outer edge 32 such that at least one of the bevelled sides 36 has a steeper angle than the others.

[0025] In a preferred embodiment, the outer edges 32 of the recesses 30 have a width dimension of between about 150mm to about 190mm, of between about 160mm to about 180mm. In a preferred embodiment, the base 34 of the recesses 30, has a width dimension of between about 90mm to about 130mm, of between about 100mm to about 120mm, of between about 110mm to about

115mm. In a preferred embodiment, the recesses 30 have a depth of between about 40mm to about 60mm. In a further preferred embodiment, the recesses have a depth of about 50mm.

[0026] In use, the recesses 30 have multiple positive effects on the functioning of the coping unit 10. During attachment of the coping unit 10 to a platform, an adhesive (usually a cement-based mortar bed) is introduced between the interface of the bottom 16 of the coping unit 10 and the platform. This mix adheres the coping unit to the substrate surface to which it is secured, and pushes up into the recess 30 before setting and fixing the coping unit 10 in place. The recesses 30 increase the surface area of contact between the coping unit 10 and the adhesive mix and thereby increase the strength of the attachment of the coping unit to the substrate. Furthermore, the bevelled sides 36 of the recesses 30 provide a surface against which the bedding adhesive within the recesses 30 can abut, reducing the possibility of the coping moving laterally parallel to the surface of the platform.

[0027] Additionally, the angle of the bevelled sides 36 reduces the chance of the bevelled sides 36 shearing due to lateral forces, further strengthening the attachment of the coping unit to the platform. Moreover, the increased surface area of the coping unit bottom provides a greater bond with the bedding adhesive to resist vertical (uplift) movement of the coping unit.

[0028] Moreover, the recesses 30 in the coping unit 10 reduce the overall weight of the unit by reducing the volume of concrete used in its formation. This results in simplifying transportation and installation, reducing associated lifting and handling issues. This reduction in weight and ease of transportation and installation greatly improves the safety associated with the construction of platforms such as those described.

[0029] To provide additional strength, a mesh 50 of vertically and horizontally extending resilient fibres is set within the coping unit 10. In a preferred embodiment, the mesh 50 is a steel mesh welded together at overlap junctions 51. In a preferred embodiment, the fibres 52 extend within the gaps between the recesses 30 where the concrete is deepest and therefore has the greatest strength. In the embodiment of Figure 2, there are five horizontally extending fibres 52 and five vertically extending fibres 52.

[0030] Figures 3a and 3b show the first embodiment of a tactile plate 12 from the top and from the end respectively. The tactile plate incorporates a number of raised or indented reliefs to provide a standard and regulatory compliant tactile surface as required to warn pedestrians they are nearing the edge of the platform. In some cases, such as when travelling with a wheeled device such as a suitcase, the raised blisters provide an audible indication that the user is nearing the edge of the platform. In the displayed embodiment, the tactile plate 12 incorporates a plurality of raised nipples 40 arrayed in a regular pattern.

[0031] In order to attach the tactile plate 12 to the coping unit, a plurality of threaded anchors 26 are integrally

formed with the tactile plate 12. The threaded anchors 26 are secured to the tactile plate and extend below the tactile plate 12 into the coping unit 10 during concrete casting. When set, the threaded anchors 26 function to secure the tactile plate 12 to the coping unit 10 but also allow for the subsequent unscrewing and removal of the tactile plate 12 for future replacement.

[0032] In the embodiment of Figure 3, the tactile plate 12 incorporates ten threaded anchors 26 disposed around the perimeter. The threaded anchors 26 are irregularly disposed along the width of the tactile plate 12 such that they do not coincide with tactile blisters but arranged for ease of future replacement (best shown in Figure 3c). In an embodiment, the tactile plate incorporates 10 regularly spaced threaded anchors 26 around the perimeter of the tactile plate 12. In a further alternative embodiment, the tactile plate 12 has, 4, 6, 8 or 12 threaded anchors.

[0033] Figure 3c shows the tactile plate 12 incorporated in the coping unit 10. In a preferred embodiment, the tactile plate 12 is monolithically set into the concrete before it has set. This has many benefits such as removing the need to cast in a cavity in the top of the coping unit which can then house the tactile plate. This would need to be separately attached, increasing the time of production and introducing another stage of potential human error. In addition, by casting the tactile plate 12 directly into the wet concrete, it ensures that the upper surface of the tactile plate 12 is flush with the top 14 of the coping unit 10, and therefore reduces the possibility of maintenance and/or health & safety issues with an exposed ridge.

[0034] In an embodiment the method of production includes the stages of, adding the tactile plate 12 to the mould prior to or during the addition of the liquid concrete mix. In an embodiment, silicone inserts are placed within the main concrete mould subsequently to pouring the liquid concrete mix to create the recesses 30. In an embodiment, between about 12 hours to about 3 days into the curing process, an acid etch is applied to the top 14 of the coping unit 10. The acid wash removes the surface layer of the coping unit 10 exposing the aggregate. This increases the coefficient of friction and reducing the possibility of an end user slipping.

[0035] The scope of the invention is defined in the following claims.

Claims

1. A coping unit (10) for use on a raised platform comprising an under-face (in use), **characterised in that** the under-face incorporates a plurality of non-continuous recesses (30).
2. A coping unit according to claim 1 wherein said recesses are shaped as frustum.

3. A coping unit according to claim 2, wherein the sides of the recesses are at an angle of between 15 and 45 degrees to vertical, in use.
4. A coping unit according to any of the preceding claims, wherein said recesses tessellate to form a regular pattern. 5
5. A coping unit according to any of the preceding claims, further incorporating a tactile plate in fixed attachment with said coping unit. 10
6. A method of constructing the coping unit of claim 5, the method being **characterised by** the step of bringing together an initially separate tactile plate and a previously cast body of the unit before the body has fully set. 15

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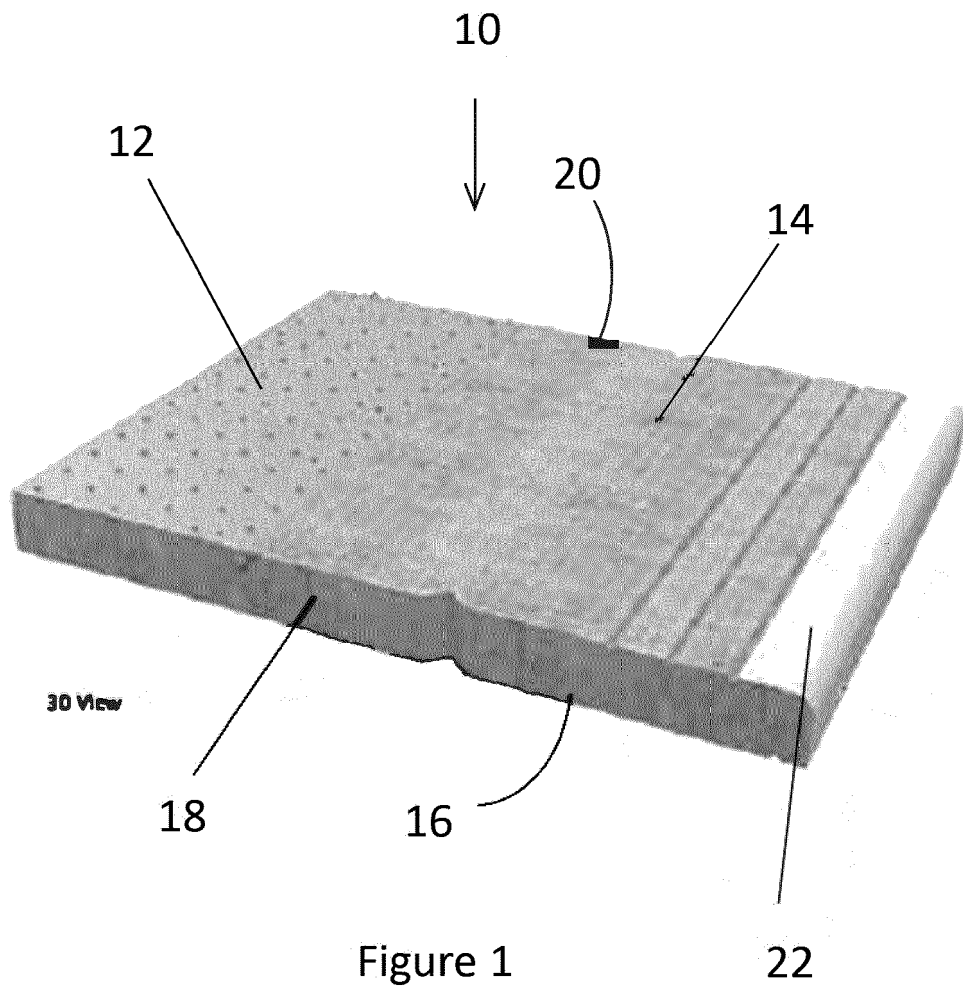


Figure 2a

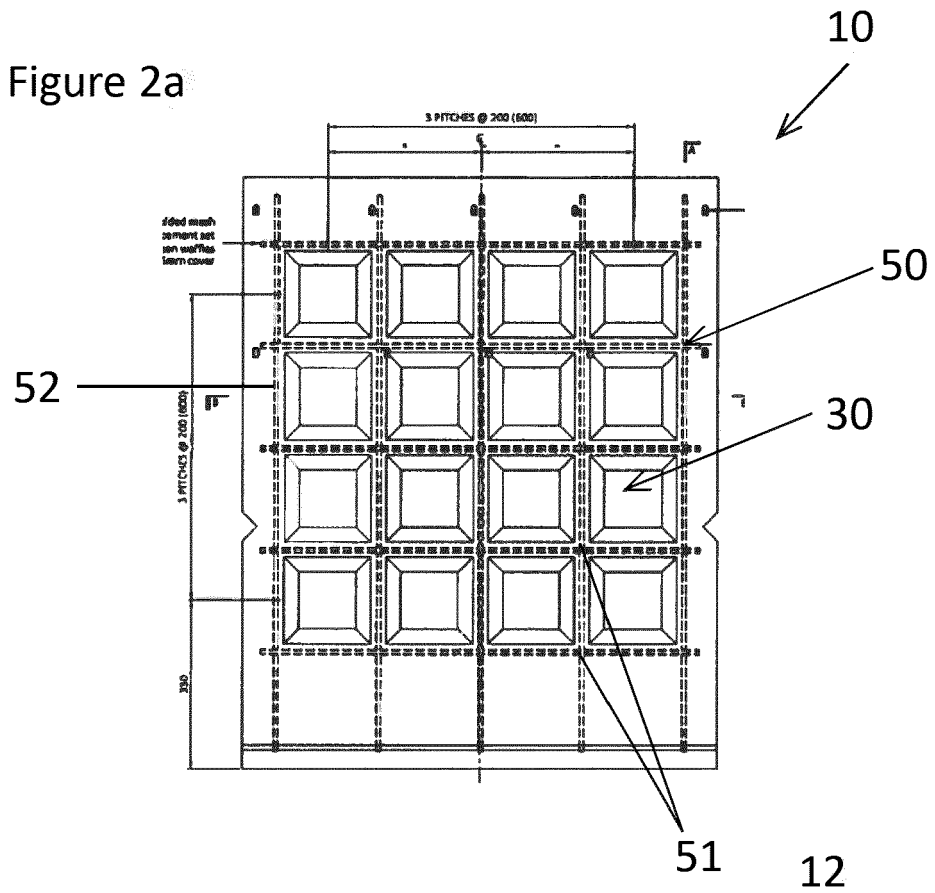


Figure 2b

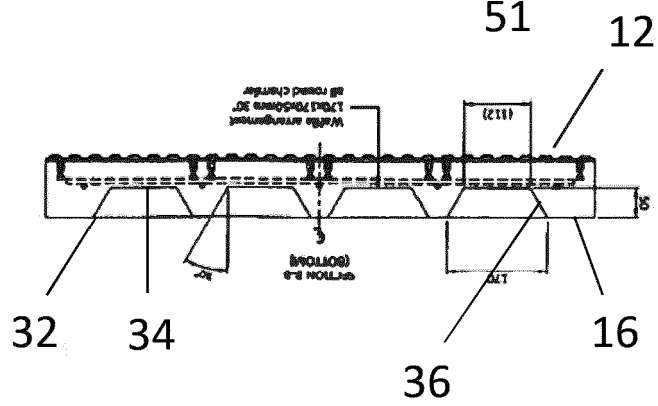


Figure 2c

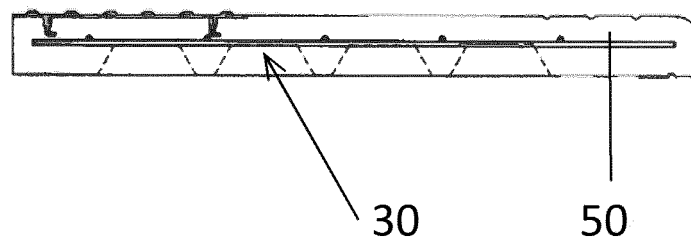


Figure 3a

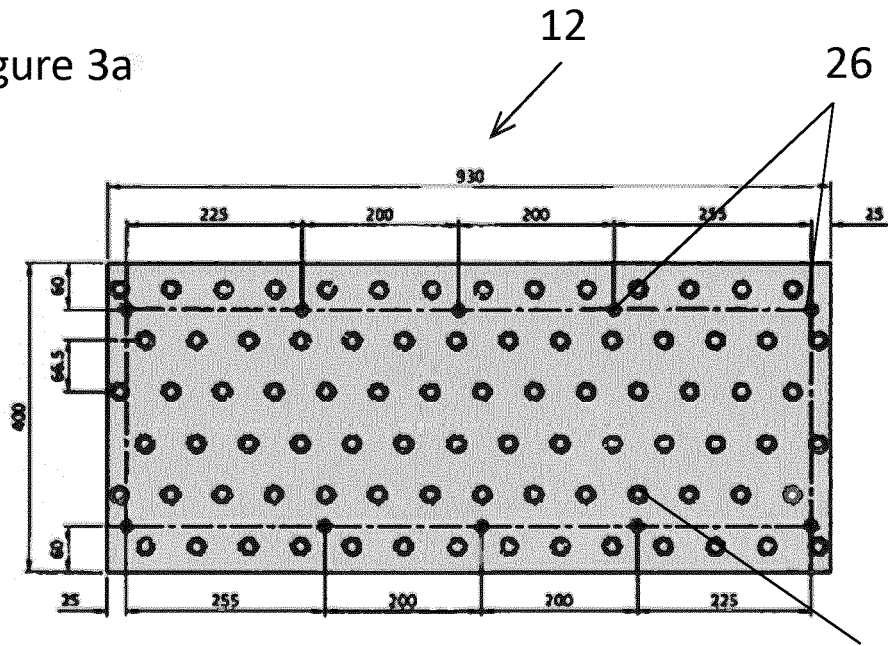


Figure 3b

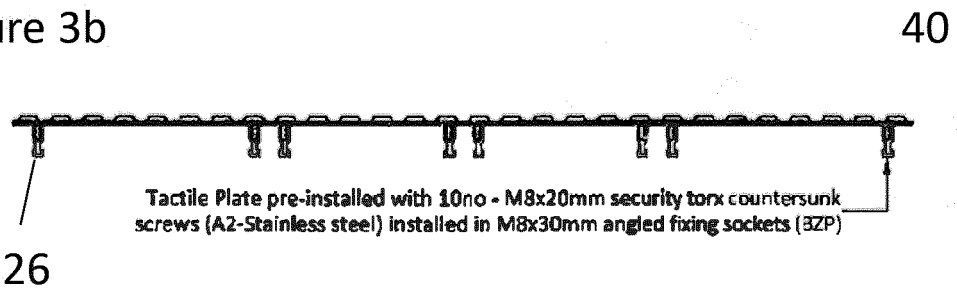
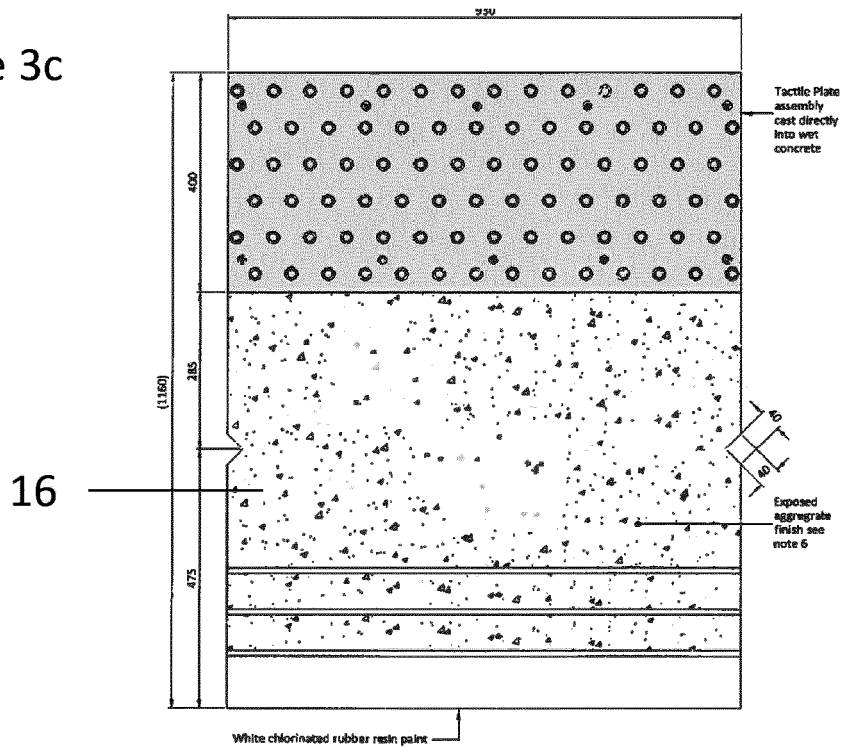


Figure 3c





EUROPEAN SEARCH REPORT

Application Number
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Place of search		Date of completion of the search	Examiner
Munich		5 May 2020	Flores Hokkanen, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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