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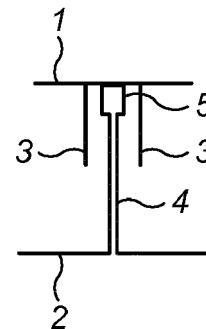
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(54) **SUSPENDED CEILING SYSTEM**

(57) The invention provides a suspended ceiling system comprising:

- (i) a supporting grid wherein the supporting grid comprises at least two substantially parallel inverted T-profiles, wherein each T-profile comprises a substantially horizontal flange and a substantially vertical web that has an upper end, and wherein the two T-profiles are at substantially the same horizontal elevation, and
- (ii) suspended between the two T-profiles a substantially planar ceiling panel that has two substantially parallel upper and lower major faces,
- (iii) wherein the supporting grid comprises a support element fitted on to at least one of the T-profiles wherein the support element provides at least one support surface that is positioned at an elevation higher than the flange of said T-profile, and
- (iv) wherein one end of the lower major face of the ceiling panel rests on the flange of one T-profile and the other end of the lower major face of the ceiling panel rests on a support surface of the support element that is fitted on to the other T-profile. The invention also provides a method of manufacturing the suspended ceiling system.



**FIG. 1**

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## Description

### Field of the Invention

**[0001]** The invention relates to a system for suspending ceiling panels in a non-planar manner, and a method of assembling such a system.

### Background of the Invention

**[0002]** It is well known to provide grid systems for suspending ceiling panels to form a suspended ceiling. Such systems commonly include two sets of runners or supports, positioned mutually perpendicularly. One set of mutually parallel supports is suspended from the building ceiling and a set of mutually parallel supports is fixed perpendicular to these.

**[0003]** It is conventional for all the ceiling panels to be suspended with their lower (visible) surface substantially horizontal, to provide a continuous planar ceiling. This gives good acoustic and aesthetic characteristics. However, it can be desirable to provide a ceiling system in which the aesthetic and physical characteristics can be altered. The absorbing properties, acoustical environment and light environment are some of the characteristics that it is desirable to be able to alter, which is possible because light and sound reflect off the ceiling panels. There are various known ways to alter the characteristics, such as by using panels made from particular materials and/or with specific designs. One particularly attractive way to achieve this is to use tilted ceiling panels. Thus, the visible surfaces of the panels are not all horizontal. This can give interesting and useful aesthetic and even acoustic effects.

**[0004]** However, it is important to maintain the possibility of convenient and economical installation. It is therefore desirable to provide a system which allows for non-horizontal ceiling tile surfaces but in which installation is convenient. It is also desirable to provide a system which allows for non-horizontal ceiling tile surfaces but is economical to provide and install.

**[0005]** In such a system it is also important that stability of the grid formed is maintained, in particular that the ceiling panels themselves are securely positioned and do not shift easily once installed.

**[0006]** In EP2662504, there is disclosed a non-planar suspended ceiling system that uses a typical, well-known supporting grid, but uses unique ceiling panels that have grooves at opposed edges. These panels slot into the grid in a specific way so that they are positioned in a tilted manner, creating the non-planar ceiling. However, this requires manufacturing and using these unique panels, which is more complicated than the manufacture of the standard and simple square or rectangular planar panels known in the industry. Furthermore, using these unique panels results in there being less flexibility with the non-planar ceiling designs and makes the implementation more complicated, particularly when integrating a mix-

ture of planar and non-planar areas of ceiling or changing an entire ceiling from planar to non-planar or *vice versa*.

**[0007]** US20030121227 discloses a suspended ceiling system comprising ceiling panels arranged in such a way as to create a multi-planar ceiling system. The aim of the system is to enhance the appearance of retail and office space. Subsequently, the panels can be arranged to create various patterns. However, similar to EP2662504, the panels that are required in the system are unique, and do not use the standard and simple square or rectangular planar panels known in the industry.

**[0008]** US20150240490 discloses a non-planar suspended ceiling system which uses a device comprising a threaded rod and a fastening hook in order to attach the ceiling panel to the supporting grid. The panels used in this system must have a connection plate on them to which the hook can be attached. The system's purpose is also for adjusting aesthetic and physical characteristics.

### Summary of the Invention

**[0009]** Accordingly, it is an aim of the invention to provide an improved non-planar suspended ceiling system which is simpler and more cost-effective to manufacture and utilises the standard square or rectangular planar panels known in the industry.

**[0010]** According to a first aspect of the invention we provide a suspended ceiling system comprising:

- (i) a supporting grid wherein the supporting grid comprises at least two substantially parallel inverted T-profiles, wherein each T-profile comprises a substantially horizontal flange and a substantially vertical web that has an upper end, and wherein the two T-profiles are at substantially the same horizontal elevation, and
- (ii) suspended between the two T-profiles a substantially planar ceiling panel that has two substantially parallel upper and lower major faces,
- (iii) wherein the supporting grid comprises a support element fitted on to at least one of the T-profiles wherein the support element provides at least one support surface that is positioned at an elevation higher than the flange of said T-profile, and
- (iv) wherein one end of the lower major face of the ceiling panel rests on the flange of one T-profile and the other end of the lower major face of the ceiling panel rests on a support surface of the support element that is fitted on to the other T-profile.

**[0011]** According to a second aspect of the invention we provide a method of manufacturing the suspended ceiling system of the invention comprising the steps of:

- (i) preparing a supporting grid by

(a) providing at least two substantially parallel inverted T-profiles in a substantially horizontal plane, each T-profile comprising a substantially horizontal flange and a substantially vertical web that has an upper end, and wherein the two T-profiles are provided at substantially the same horizontal elevation,

(b) providing a support element and fitting it on to at least one of the T-profiles in a manner which provides at least one support surface at an elevation higher than the flange of said T-profile,

(ii) suspending between the two T-profiles a substantially planar ceiling panel that has two substantially parallel upper and lower major faces wherein one end of the lower major face of the ceiling panel rests on the flange of one T-profile and the other end of the lower major face of the ceiling panel rests on a support surface of the support element that is fitted on to the other T-profile.

#### Brief Description of the Figures

##### **[0012]**

Figure 1: Shows a T-profile fitted with an exemplary simple support element.

Figure 2: Shows a T-profile fitted with an exemplary inverted U-profile support element.

Figure 3A and 3B: Shows T-profiles fitted with support elements that comprise at least one C-profile.

Figure 4A and 4B: Shows T-profiles fitted with support elements that comprise at least one step.

Figure 5A, 5B and 5C: Shows T-profiles fitted with support elements that comprise at least one inclined support surface.

Figure 6: Shows a picture of an exemplary assembled supporting grid structure.

Figure 7A, 7B and 7C: Shows different possible arrangements of the ceiling panels on the flanges of the T-profiles and the support surfaces of the support elements.

#### Detailed Description of the Invention

**[0013]** "Substantially" means that there are workable variations to the descriptions of features whereby the word "substantially" is used. For example, where a first feature is described as "substantially parallel" to a second feature, the first feature may be +/- up to 2 degrees parallel to the second feature, i.e. the feature would not need to be exactly parallel in order to perform its function, and

consequently as long as the first feature performs adequately its function, it would be considered parallel.

**[0014]** Specifically in relation to the elevation of the T-profiles there is an industry standard: EN 013964:2014 which recommends +/- 0.25 mm/m between two T-profiles and +/- 0.25 mm between cross-runners. In particular, there is a maximum difference in level of +/- 1 mm between neighbouring T-profiles, and, when (as is usual) cross-runners are present, a tolerance of +/- 1 mm on a diagonal across the squares/rectangles (600 x 600 mm or 1200 x 600 mm) formed in a standard supporting grid to ensure that T-profiles and cross-runners are at right angles.

**[0015]** The T-profiles used in the invention are of well-known general construction and are produced in large quantities, making the system of the invention particularly economical to operate. Supports of this kind are generally made of a strip of metal which is folded to form the substantially vertical web of the T-profile and the substantially horizontal flange at one end of the web. As is conventional for such T-profiles, in some embodiments the folding generates a hollow bulb at the opposite end of the web from the flange.

**[0016]** An advantage of the use of T-profiles is that they are made in large quantities and are, as a consequence, economically advantageous. They are made in slightly varying forms by different manufacturers, but each manufacturer provides a variety of inverted T-profile supports having the same general shape, differing only in the length of the profile. They may also differ in the manner in which they are joined at their ends. An example of a suitable T-profile is a T-profile having a height of 38 mm and a width of the lower flange part of 24 mm.

**[0017]** The ceiling panel used in the invention has two substantially parallel upper and lower major faces, and one or more minor faces extending between, and typically substantially perpendicular to, the major faces. Usually the major faces are substantially rectangular (often square). Other shapes are possible, provided the panels are configured so as to be capable of fitting into the supporting grid. The panels are planar, i.e. they are flat and are not curved or inclined. They also are not required to have grooves, or major surfaces inclined away from each other, as is required in some systems of the prior art.

**[0018]** The ceiling panel may be a man-made vitreous fibre (MMVF) panel or a wood wool cement panel, preferably an MMVF panel. It is also possible to use other types of panels in the invention, e.g. gypsum panels, wet-laid acoustic panels or metal panels.

**[0019]** Preferably the panel is a MMVF panel comprising bonded MMVF. The MMVF panel may comprise a bonded, nonwoven web of MMVF. The MMVF can for example be selected from stone fibres, glass fibres, slag fibres and ceramic fibres, preferably stone fibres. MMVF panels suitable for use in the invention may have a density of 65-165 kg/m<sup>3</sup>. This density of MMVF is particularly suitable for acoustic suspended ceiling panels. Generally a higher density of around 150 kg/m<sup>3</sup> is used for select

panels with high demands for the visual quality. In case of more simple edges a density in the range of 80-120 kg/m<sup>3</sup> is often adequate. A lower density means lower production cost, but with sacrifice of strength and edge quality.

**[0020]** A wood wool cement panel may comprise strands of wood - the "wood wool" component is sometimes referred to as "excelsior" - that are bonded with cement. Wood strands may have a diameter of from 0.5 to 3 mm. The wood strands may lie substantially in the plane of the major faces of the panel, such that many cut ends of wood strands are present at the minor faces of the panel. The wood wool cement panel may consist entirely of wood wool and cement. Alternatively, the wood wool cement panel may be a "sandwich panel", comprising two wood wool cement boards separated by a core material such as expanded polystyrene, MMVF, or other insulating materials.

**[0021]** The ceiling panel may have a length in the range of 600 to 1200 mm, which is standard length in Europe, but other lengths could be relevant. The length of the ceiling panel normally corresponds with the length of the major faces. The ceiling panel may have a width in the range 300 to 1200 mm. The width of the panel normally corresponds with the width of the major faces. The panel may have a thickness in the range 10-100 mm, preferably 10-40 mm. The thickness of the panel corresponds with the width of the minor face or faces. The thickness of a MMVF panel is suitably 10-40 mm. The thickness of a wood wool cement panel is suitably 10-50 mm, such as 25 or 35 or 50 mm, preferably 25 or 30 mm.

**[0022]** Preferably at least one, more preferably both, of the major faces of the panel, are exposed MMVF or wood wool cement, and are not provided with an impermeable facing. They can be provided with a permeable fibrous facing. Preferably the first major face is provided with an MMVF facing, more preferably a glass fibre facing. This is conventional for ceiling panels.

**[0023]** The primary function of the support element is to provide at least one support surface that is positioned at an elevation higher than the flange of the T-profile. The support surface is for one end of a ceiling panel to rest upon, whilst the other end rests on the flange of another T-profile. This results in the ceiling panel being in a tilted disposition, i.e. it is not lying in the horizontal plane formed by the supporting grid.

**[0024]** Suitably, the support element may provide one support surface. In some embodiments, at least one support surface is positioned above the upper end of the vertical web of the T-profile or at least one support surface is positioned on one side of the vertical web of the T-profile at an elevation lower than a level in line with the upper end of the vertical web of the T-profile.

**[0025]** Suitably, the support element may provide two support surfaces.

**[0026]** For example, the support element may provide a support surface positioned above the upper end of the vertical web of the T-profile and a support surface posi-

tioned on one side of the vertical web of the T-profile at an elevation lower than a level in line with the upper end of the vertical web of the T-profile. This allows flexibility with respect to the angle of inclination at which a panel can be positioned, depending on which support surface is used.

**[0027]** Alternatively, the support element may provide a support surface positioned on one side of the vertical web of the T-profile, which can be at an elevation lower than a level in line with the upper end of the vertical web of the T-profile and a second support surface positioned on the other side of the vertical web of the T-profile, which can be at an elevation lower than a level in line with the upper end of the vertical web of the T-profile. This allows the positioning of two panels resting on support surfaces of the same support element, one on each side of the T-profile.

**[0028]** The support element is a separate element, discrete from the T-profile. This means that, as described in preferred embodiments below, the support element can be a standard element already commercially available. The support element needs to be a stable structure that will not become displaced from the T-profile, or alter the stability of the supporting grid. An advantage of the invention is that the support element can be configured so that it does not require a fastener to attach the support element to the T-profile. The structure of the support element and the way in which it is fitted around or over the T-profile can provide the required stability. The support element typically comprises vertical webs and/or side webs and/or upper surfaces and/or lower surfaces which prevent the support element from rotating around the T-profile or from becoming displaced from the T-profile. If there is a tendency to rotate then a surface of the support element bears against a surface of the T-profile, or a surface of a second support element, if used, or both, to prevent further rotation. Furthermore, the pressure applied by the ceiling panel on the support surface also aids the stability of the structure preventing any rotation or displacement of the support element.

**[0029]** However, it is possible to use fasteners, such as clips, self-tapping screws or rivets, to further increase the stability of the support element and the supporting grid if the user desires.

**[0030]** The support element may be a variety of different means, which provide the required at least one support surface. The figures exemplify some specific support elements that are suitable for use in the invention.

**[0031]** In one simple structure (exemplified in Figure 1) the support element is a substantially horizontal sheet (1), i.e. the support surface, parallel to the flange (2) of the T-profile, wherein the sheet comprises two substantially central substantially vertical webs (3) extending downwards so that the vertical web (4) of the T-profile is placed in between them. The vertical webs of the support element are preferably close enough to the vertical web of the T-profile so that each vertical web of the support element is in contact with the vertical web of the T-profile

i.e. the vertical webs of the support element act effectively as a clip gripping around the bulb of the T-profile. Similarly, if there is a bulb (5) present at the end of the vertical web of the T-profile, the vertical webs of the support element may be in contact with the bulb.

**[0032]** The vertical webs of the support element may extend downwards to a variety of depths to provide additional stability to the structure and also to hide the web of the T-profile when viewed from below the ceiling. For example, vertical webs of the support element may extend downwards to a level in line with about one quarter of the way down the vertical web of the T-profile, preferably about one half of the way down, more preferably about three quarters of the way down. In some embodiments, the vertical webs of the support element extend downwards to substantially the same level of the flange of the T-profile.

**[0033]** As exemplified in Figure 2, the support element may also take the form of an inverted U-profile comprising an upper surface (6) and two substantially vertical side webs (7) fitted over the T-profile wherein the U-profile's upper surface is above the upper end of the web (4) of the T-profile and the two side webs extend downwards. The upper surface provides the required support surface. The side webs may extend downwards to a variety of depths to provide additional stability to the structure and also to hide the web of the T-profile from the view of somebody below the ceiling. For example, the side webs may extend downwards to a level in line with about one quarter of the way down the vertical web of the T-profile, preferably about one half of the way down, more preferably about three quarters of the way down. In some embodiments, the side webs of the support element extend downwards to substantially the same level of the flange of the T-profile. The inverted U-profile is a standard structure known in the industry and is simple and quick to manufacture which increases the ease and speed of manufacturing the suspended ceiling system. This embodiment of the support element is easy to mount, and the risk of incorrect assembly is minimal.

**[0034]** In an alternative embodiment (as exemplified in Figure 3A), the support element may take the form of a C-profile fitted around the T-profile, the C-profile comprising one upper surface (6) above the upper end of the web (4) of a T-profile, one lower surface (8) below the flange (2) of a T-profile and one substantially vertical web (9) joining the upper and lower surfaces. The upper surface provides the required support surface. The shape of the C-profile helps provide stability to the structure and it also hides the web of the T-profile when viewed from below the ceiling. The C-profile is a standard structure known in the industry and is simple and quick to manufacture which increases the ease and speed of manufacturing the suspended ceiling system.

**[0035]** As shown in Figure 3B, the support element may further comprise a second C-profile fitted around the T-profile opposing the first C-profile encasing the T-profile, the second C-profile comprising one upper sur-

face (6) above the upper end of the web of the T-profile, one lower surface (8) below the flange of the T-profile and one substantially vertical web (9) joining the upper and lower surfaces. Therefore the upper surface of one C-profile will be on top of the upper surface of the other C-profile and the two surfaces will be substantially parallel to each other. It can be the upper surface of either C-profile that is on top of the other, i.e. providing the support surface on which the lower major face of the ceiling panel rests. Similarly the lower surface of one C-profile will be on top of the lower surface of the other C-profile and the two surfaces will be substantially parallel to each other. Preferably the vertical web of the C-profile has a depth that is slightly greater than the vertical web of the T-profile to enable the C-profile to be fitted around the T-profile. This support element provides particularly good stability to the supporting grid and entirely hides the web of the T-profile when viewed from below the ceiling.

**[0036]** The upper surface of the C-profile may be shorter than the lower surface, i.e. the upper surface may be extending only as far as the upper end of the web of the T-profile, whereas the lower surface may cover the whole lower surface of the flange of the T-profile.

**[0037]** In one embodiment (exemplified in Figures 4A and 4B), the support element comprises a step and provides at least one or two support surfaces (10, 11 and 12) that are each substantially parallel to the flange (2) of the T-profile, wherein at least one support surface is below the level in line with the upper end of the vertical web of the T-profile. A "step" means two non-overlapping substantially parallel and substantially horizontal surfaces (e.g. 10 and 11 in Figures 4a and 4B) that are joined by a substantially vertical web (e.g. 13 in Figures 4A and 4B).

**[0038]** The support surface of the invention may be inclined. "Inclined" means that the support surface is at an angle in relation to the flange of the T-profile, i.e. the inclined support surface and the flange of the T-profile are not parallel, and the end of the inclined support surface that is closest to the web of the T-profile is higher than the end that is further from the web of the T-profile. Suitably, the support element comprises at least one or two support surfaces that are inclined. To increase the stability of the support element, it may further comprise at least one or two substantially vertical side webs and/or a substantially horizontal lower surface which is positioned under the flange of the T-profile.

**[0039]** In a particular aspect of the invention (exemplified in Figure 5A), the support element may be fitted around the T-profile and comprise a substantially horizontal upper surface (6) above the upper end of the web (4) of the T-profile, a substantially horizontal lower surface (8) below the flange (2) of the T-profile and a substantially vertical side web (14) wherein the upper surface and the side web are connected by an inclined support surface (15). In this example, the upper surface may also provide a support surface.

**[0040]** In another aspect of the invention (exemplified

in Figure 5B), the support element may be fitted over the T-profile and comprise a substantially horizontal upper surface (6) above the upper end of the web (4) of the T-profile, two substantially vertical side webs (14) that extend downwards to substantially the same level of the flange (2) of the T-profile, and two inclined support surfaces (15), wherein one of the inclined support surfaces connects one side web to one end of the upper surface and the other inclined support surface connects the other side web to the other end of the upper surface.

**[0041]** In another aspect of the invention (exemplified in Figure 5C), the support element may be fitted over the T-profile and comprise a substantially horizontal upper surface (6) above the upper end of the web (4) of the T-profile, a first set of two substantially vertical side webs (14) that extend downwards from both ends of the upper surface, a second set of two substantially vertical side webs (16) that extend downwards to substantially the same level of the flange (2) of the T-profile, and two inclined support surfaces (15), wherein one of the inclined support surfaces connects one side web of the first set of side webs to one side web of the second set of side webs and the other inclined support surface connects the other side web of the first set of side webs to the other side web of the second set of side webs.

**[0042]** The support element and the support surfaces of the support element may extend along the entire length of the T-profile, or part of the T-profile, including alternative sections of the T-profile, depending on the requirements and design of the suspended non-planar ceiling.

**[0043]** The supporting grid and the support element may be made from a variety of suitable materials, including metals such as steel (for example stainless steel), aluminium, or copper, preferably steel. Various types of plastics could also be used. These are less preferred. Metals are preferred in view of fire resistance properties..

**[0044]** There are various arrangements that the supporting grid for carrying the suspended ceiling may take which allow for the different arrangements and designs of the ceiling panels. In some embodiments, the supporting grid comprises two support elements which each provide at least one support surface that is positioned at an elevation higher than the flange of at least two of the neighbouring T-profiles. Suitably, the supporting grid comprises at least three support elements which each provide at least one support surface that is positioned at an elevation higher than the flange of at least three of the other T-profiles. The suspended ceiling system will comprise as many T-profiles as is required to make the ceiling the desired size.

**[0045]** Therefore, in a typical supporting grid, there is a plurality of substantially parallel inverted T-profiles extending across the ceiling, including at least three T-profiles, such as at least four T-profiles, for example at least five T-profiles. Figure 6 illustrates the overall general structure of an assembled supporting grid.

**[0046]** The suspended ceiling system will comprise as many ceiling panels as are required to make the ceiling

the desired size. This may be at least two ceiling panels, such as at least three ceiling panels, for example at least four ceiling panels. The ceiling panels may be arranged in rows along the length of the T-profiles, i.e. there is more than one ceiling panel suspended between two parallel inverted T-profiles, and/or the ceiling panels may be arranged in rows across the T-profiles. Combinations of these two arrangements will make grids of the ceiling panels. The number of ceiling panels in each of the rows may be the same or different, such as a 5x5 grid or a 6x8 grid, in order to cover the whole ceiling.

**[0047]** When there is a grid of ceiling panels as described above, the supporting grid further comprises in a substantially horizontal plane at least two substantially parallel cross-runners substantially perpendicular to the T-profiles. Examples of such cross-runners are well-known in the industry. The cross-runners may be inverted T-profiles, U-profiles, inverted U-profiles or "Omega-shaped" (inverted U-profiles with flanges at the ends of the side webs), preferably inverted T-profiles. The T-profiles and/or the cross-runners may be attached to a ceiling or a wall, in known manner.

**[0048]** As shown in Figure 7A, the ceiling panels (17) may be positioned on the flanges (2) of T-profiles and the support surfaces (18) in an arrangement that results in all of the panels being aligned and parallel to each other creating a uniform but non-planar ceiling. Alternatively, as shown in Figure 7B, in two adjacent ceiling panels may each rest their adjacent ends (19) on the flange (2) of a single one of the T-profiles, creating a V-shape. Alternatively, as shown in Figure 7C, two adjacent ceiling panels may each rest their adjacent ends (19) on the support surface (18) of the support element fitted on to a single one of the T-profiles, creating an inverted V-shape. It will therefore be clear that a ceiling comprising a plurality of ceiling panels may create combinations of these arrangements to suit the designer. These arrangements are also not restricted to the support element shown in Figure 7 and may be applied to all of the different support elements described in the application. These arrangements are not drawn to scale. In practice the distance between the parallel T-profiles would be significantly greater than the height of the T-profiles, as is conventional.

**[0049]** Due to the simplicity of the design of the suspended ceiling system, the system provides great flexibility to the user. It is easy to alter the positioning of each of the individual ceiling panels after the initial installation, if it is desired by the user to do so, in order to change the arrangements of them and the overall design.

**[0050]** It will be appreciated by the skilled person that the method of the second aspect of the invention may provide a suspended ceiling system that has any of the additional features described above in the context of the first aspect of the invention.

**Claims****1.** A suspended ceiling system comprising:

(i) a supporting grid wherein the supporting grid comprises at least two substantially parallel inverted T-profiles, wherein each T-profile comprises a substantially horizontal flange and a substantially vertical web that has an upper end, and wherein the two T-profiles are at substantially the same horizontal elevation, and  
 (ii) suspended between the two T-profiles a substantially planar ceiling panel that has two substantially parallel upper and lower major faces,  
 (iii) wherein the supporting grid comprises a support element fitted on to at least one of the T-profiles wherein the support element provides at least one support surface that is positioned at an elevation higher than the flange of said T-profile, and  
 (iv) wherein one end of the lower major face of the ceiling panel rests on the flange of one T-profile and the other end of the lower major face of the ceiling panel rests on a support surface of the support element that is fitted on to the other T-profile.

**2.** The suspended ceiling system of claim 1 wherein the support element comprises an inverted U-profile, comprising an upper surface and two side webs, fitted over the T-profile wherein its upper surface is above the upper end of the web and the two side webs extend downwards and the upper surface of the U-profile provides the support surface.

**3.** The suspended ceiling system of claim 2 wherein the side webs extend downwards to substantially the level of the flange of the T-profile.

**4.** The suspended ceiling system of claim 1 wherein the support element comprises a C-profile fitted around the T-profile, the C-profile comprising one upper surface above the upper end of the web of the T-profile, one lower surface below the flange of the T-profile and one substantially vertical web joining the upper and lower surfaces, wherein the upper surface of the C-profile provides the support surface.

**5.** The suspended ceiling system of claim 4 wherein the support element further comprises a second C-profile fitted around the T-profile, the second C-profile opposing the first C-profile that encases the T-profile, the second C-profile comprising one upper surface above the upper end of the web of the T-profile, one lower surface below the flange of the T-profile and one substantially vertical web joining the upper and lower surfaces.

**6.** The suspended ceiling system of any one of claims 1 to 5 wherein the vertical web of the T-profile further comprises a bulb.

**7.** The suspended ceiling system of any one of claims 1 to 6 wherein the supporting grid comprises two support elements which each provide a support surface fitted on to at least two of the T-profiles.

**8.** The suspended ceiling system of any one of claims 1 to 7 wherein the suspended ceiling system comprises at least three substantially parallel inverted T-profiles.

**9.** The suspended ceiling system of claim 8 wherein the suspended ceiling system comprises at least two of the ceiling panels.

**10.** The suspended ceiling system of claim 9 wherein the two ceiling panels each rest on the flange of a single one of the T-profiles.

**11.** The suspended ceiling system of claim 9 wherein the two ceiling panels each rest on a support surface provided by a single support element fitted on to a single one of the T-profiles.

**12.** The suspended ceiling system of any one of claims 1 to 11 wherein the support element is made from steel.

**13.** The suspended ceiling system of any one of claims 1 to 12 wherein the ceiling panel is made from man-made vitreous fibre.

**14.** The suspended ceiling system of any one of claims 1 to 13 wherein the supporting grid further comprises in a substantially horizontal plane at least two substantially parallel cross-runners substantially perpendicular to the T-profiles.

**15.** A method of manufacturing the suspended ceiling system of any one of claims 1 to 14 comprising the steps of:

(i) preparing a supporting grid by

(a) providing at least two substantially parallel inverted T-profiles in a substantially horizontal plane, each T-profile comprising a substantially horizontal flange and a substantially vertical web that has an upper end, and wherein the two T-profiles are provided at substantially the same horizontal elevation,

(b) providing a support element and fitting it on to at least one of the T-profiles in a manner which provides at least one support

surface at an elevation higher than the flange of said T-profile ,

(ii) suspending between the two T-profiles a substantially planar ceiling panel that has two substantially parallel upper and lower major faces wherein one end of the lower major face of the ceiling panel rests on the flange of one T-profile and the other end of the lower major face of the ceiling panel rests on a support surface of the support element that is fitted on to the other T-profile.

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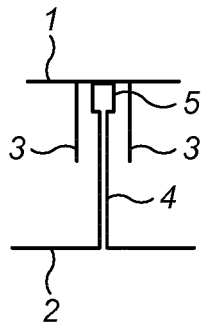
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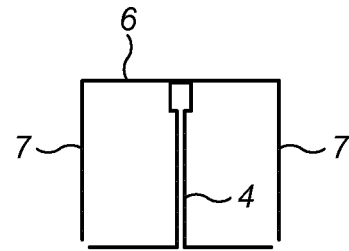
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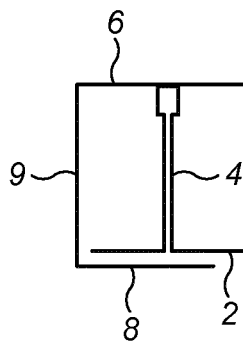
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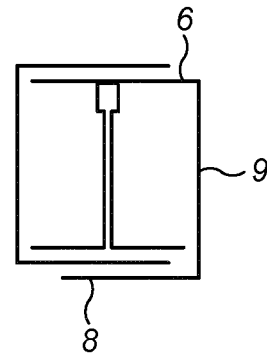
**FIG. 1**



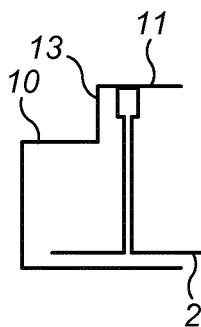
**FIG. 2**



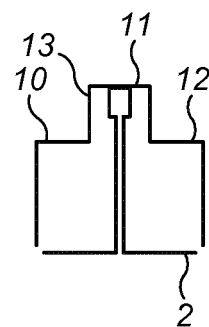
**FIG. 3A**



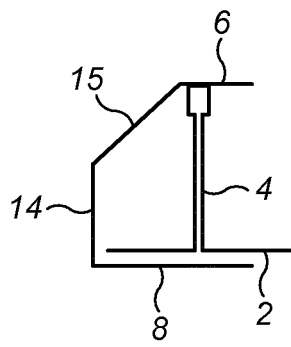
**FIG. 3B**



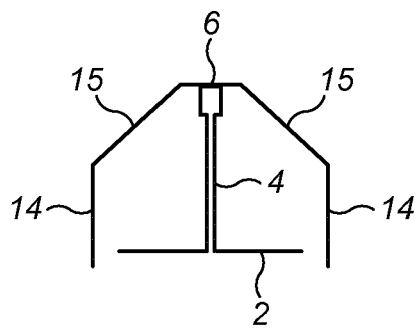
**FIG. 4A**



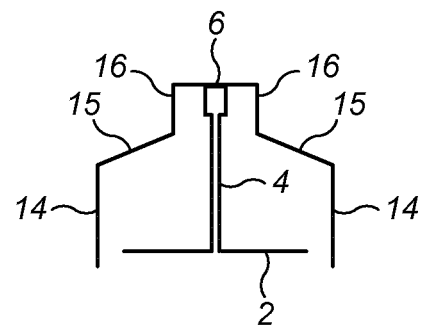
**FIG. 4B**



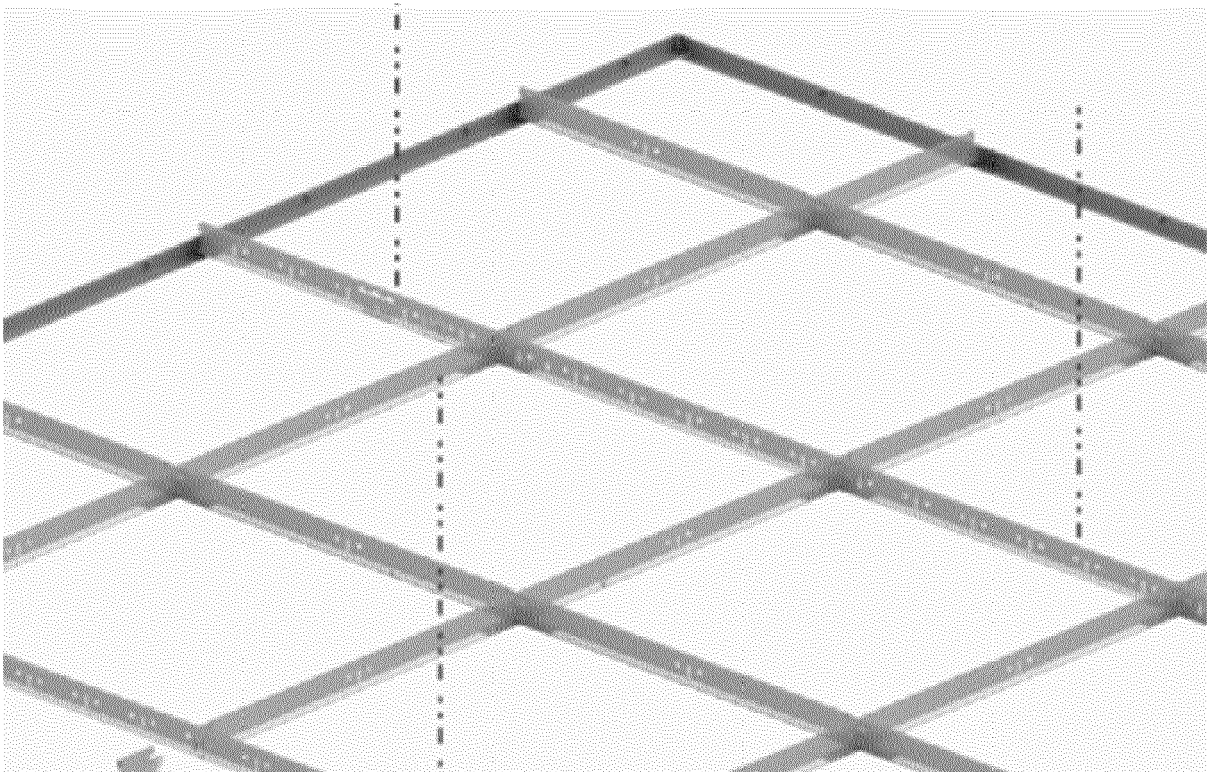
**FIG. 5A**



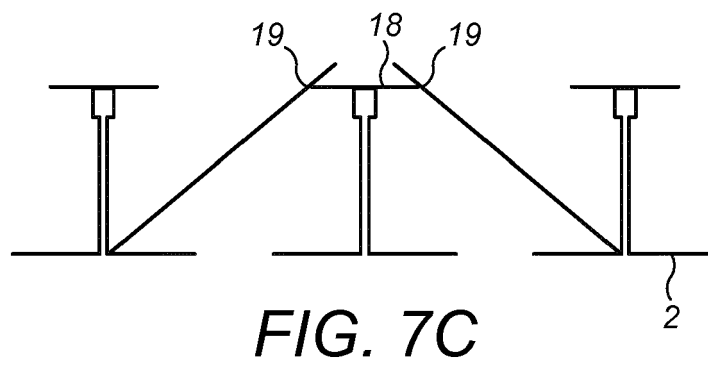
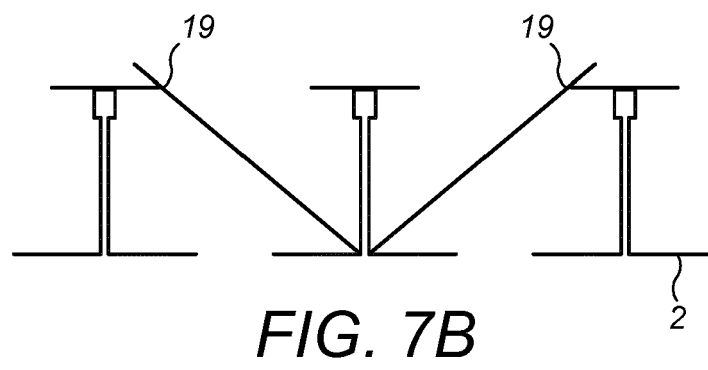
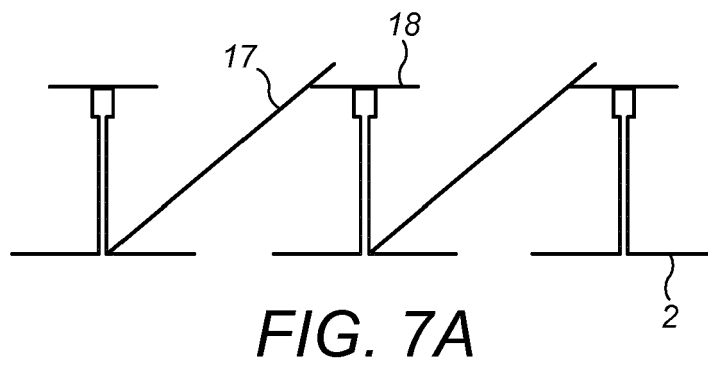
**FIG. 5B**



**FIG. 5C**



**FIG. 6**





## EUROPEAN SEARCH REPORT

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| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                   | Date of completion of the search<br><b>7 March 2019</b> | Examiner<br><b>Lopes, Claudia</b>       |
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