(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 221 426 A2

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.08.2010 Bulletin 2010/34

(51) Int Cl.:
E04B 9/30 *(2006.01)*

(21) Application number: **09179254.9**

(22) Date of filing: **12.02.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
09152687.1 / 2 218 844

(71) Applicant: **Saint-Gobain Ecophon AB**
260 61 Hyllinge (SE)

(72) Inventor: **Wilkens, Jan**
263 39 Hyllinge (SE)

(74) Representative: **Åkesson, Sten Jan-Åke**
Awapatent AB
Box 1066
251 10 Helsingborg (SE)

Remarks:
This application was filed on 15-12-2009 as a divisional application to the application mentioned under INID code 62.

(54) **A suspended ceiling and a method for supporting a suspended ceiling**

(57) The present invention relates to a suspended ceiling comprising a profile (1) and at least one tile made of compressed fibre material such as mineral wool. The profile (1) extends along a longitudinal direction and being adapted to extend along and to be fastened to a surface. The profile (1) comprises at least two attachment portions (10), each attachment portion (10) being adapted to receive a fastening means for fastening the profile (1) to said surface. Each of said at least two attachments portions (10) is resilient in a direction being adapted to at least partly point towards said surface for accommodating to any irregularities of said surface. The profile (1) supports said at least one ceiling tile. The present invention further relates to a method for supporting a suspended ceiling.

EP 2 221 426 A2

Description

Field of the invention

[0001] The present invention relates to a suspended ceiling comprising a profile and at least one ceiling tile made of compressed fibre material. The profile comprises at least two attachment portions, each attachment portion being adapted to receive a fastening means for fastening the profile to a surface. The present invention further relates to a method for supporting a suspended ceiling.

Technical background

[0002] When mounting a ceiling comprising tiles having sound-absorbing and/or sound-insulation properties, the object is mainly to improve the acoustic environment of the room but it often also an object to conceal cable arrangements, ventilation equipment, lighting installations and other features. Additionally, the ceiling affects the aesthetic impression of the room, since the ceiling may contribute to the overall impression of the room and enhance the architectural experience of the interior of a building.

[0003] Having the aesthetical aspect in mind, it is important that no element disturbs the overall impression of the ceiling. Disturbing element could be edges that are not straight, damaged edges, negligent mounting of the tiles, etc.

[0004] A further aspect is that when mounting a ceiling comprising tiles and a grid system supporting the tiles, approximately 80 % of the time for mounting the complete ceiling is for mounting the grid system and cutting the perimeter tiles, and only 20 % of the time is for mounting the central tiles. Thus, mounting the grid is a time-consuming task. Further, even small mistakes or inaccuracies in the mounting of the grid become highly visible when mounting the tiles and it results in a less aesthetic impression of the ceiling.

[0005] Not only mistakes originating from the mounting of the ceiling affect the visual impression of the ceiling, also small imperfections of the room or building structure may become highly visible. For example, walls, or other surfaces, are seldom completely planar. A commonly used L-profile for supporting the tiles along the wall will follow the irregularities of the wall and thereby becomes twisted. As a result, the surface of the profile adapted to support the tiles will not be parallel to the flooring/ceiling structure. Along portions where the profile is twisted (i.e. where the supporting surface of the profile is sloping towards the floor or towards the flooring/ceiling structure), the tiles are not completely abutting the supporting surface. Consequently, a gap is formed between the supporting surface of the profile and the tile along the twisted portion or along neighbouring portions. In such a gap, a shadow is formed, the shadow being visible from the room and creating an impression of the ceiling being wobbling or wave formed.

[0006] In order to diminish the visual effects associated with walls, or other surfaces, not being planar, shadow-line trims have been used to create small gaps between the wall and the tiles. The bigger the gap, the less the wall needs to be planar. With this solution, the tiles are arranged at a distance from the wall. As the tiles arranged adjacent the wall nearly always have to be cut, and thereby having a cut edge facing the wall, the cut edge has to be provided with a trimming or sealing if it is visible from the room. Nevertheless, if the profile is fastened to a wall not being planar, the profile, and consequently the tiles, will not be straight. Using shadow line trimming tries to hide this imperfection visually. Further, this solution does not solve the problem associated with twisted profiles.

[0007] FR 2 740 800 discloses an arrangement for fastening tiles to the walls of a corridor. A first profile being fastened to the wall is adapted to receive a second profile, the second profile being movable within the first profile in a direction essentially perpendicular to the wall. As the second profile being movable within the first profile, this arrangement allows adaptation to varying distance between the walls of the corridor. Even if the arrangement allows adaptation to walls not being planar, the disclosed solution represents a complicated arrangement comprising a plurality of profiles for fastening the supporting structure to the wall and then elements for mounting the tiles to the supporting structure. Additionally, the second profiles supporting the tiles have to be manually adjusted in order to form a straight line. In order to ensure that the profiles are maintained in this position, the second profile has to be secured to the first profile in an additional step. Further, this solution does not solve the problem associated with twisted profiles.

[0008] Even if the previous discussion has been focused on walls being irregular or non-planar, similar problems apply to ceilings, or any other surface of a building. The previous discussion has been focused on ceiling tiles, but similar problems apply to other types of tiles.

Summary of the invention

[0009] It is an object of the present invention to provide a suspended ceiling comprising a profile adapted to be fastened along a surface, which profile remains straight after having been fastened to the surface even if the surface is irregular or wave-formed.

[0010] This and other objects and advantages that will be apparent from the description have been achieved by a suspended ceiling comprising a profile and at least one ceiling tile made of compressed fibre material, such as mineral wool, the profile forming part of a grid supporting said suspended ceiling, wherein the profile comprises at least two attachment portions, each attachment portion being adapted to receive a fastening means for fastening the profile to said surface, wherein each of said at least two attachments portions is resilient in a direction being adapted to at least partly point towards said surface for

accommodating to any irregularities of said surface, and wherein the profile supports said at least one ceiling tile.

[0011] The profile may be adapted to support at least one tile and/or a secondary profile in turn being adapted to support at least one tile. The tile may be a ceiling tile, a floor tile, a wall tile or the like. The invention is especially suited for ceiling tiles, for example ceiling tiles made of compressed fibre material, such as mineral wool. The tile may, for example, be a sound absorber having sound-absorbing properties, and/or may be a sound-insulation element preventing sound from leaking from one room to another.

[0012] An advantage of the present invention is that the profile accommodates to or adjusts to any irregularities of the surface. Even if the surface, such as a wall, is not completely planar, the profile will remain straight after being fastened to the surface and will not follow the irregularities or the wave form of the surface.

[0013] The profile is adapted to abut the surface along its longitudinal extension. If the surface is irregular or wave-formed, the profile abuts only top portions of the surface. At some positions, a gap may be formed between the profile and the surface. If the attachment portion is positioned where such a gap is formed, the attachment portion will move towards the surface due to its resilient properties when fastening the profile by means of the fastening means being received in the attachment portion. The attachment portion is then abutting the surface but the rest of the profile will be positioned at a distance from the surface. The profile will remain straight and will not move towards the surface since the bending resistance of the profile is larger compared to the resistance of the resilient attachment portion.

[0014] Thereby, any wobbling or twisting of the profile is reduced, since the profile remains straight even after being fastened to a surface which is irregular. Consequently, a supporting surface of the profile, such as a flange, will form a plane surface even after the profile is fastened to a surface which is irregular or wave-formed. Thereby, no gap will occur between the supporting surface of the profile and any tiles supported by the profile. Consequently, no shadows will occur between the profile and the tiles, and the visual impression of the profile is improved.

[0015] Since a gap may be formed between the profile and the surface due to the irregularities of the surface, a shadow may be formed between the surface and the profile. This shadow is less marked compared to a shadow formed between the profile and a tile. In contrast to a gap formed between the profile and the tile, a gap formed between the profile and the surface may be disposed of, for example by covering it or filling it by adding a filler material between the profile and the surface.

[0016] When the profile remains straight, any tiles supported by the profile forms an edge being straight adjacent the profile. The edge formed by the tiles does not follow any irregularities of the surface but remains straight even if the surface is irregular, which improves the visual impression for a example a suspended ceiling supported by the profile.

[0017] When the profile does not follow any irregularities of the surface, and when the profile forms a plane support for tiles and/or a secondary profile, the profile visually hides the imperfections of the surface, and thereby improves the visual impression.

[0018] Additionally, the present inventions reduces the mechanical strain of the profile when attached to the surface and thereby reduces the risk of the profile being twisted due to releasing of stress originating from the forming of the profile.

[0019] Another advantage is that when the profile is used for supporting baffle tiles, the profile accommodates any irregularities of the flooring/ceiling structures and the upper side of the baffle tiles will form a straight line. When using the inventive profile, the baffle tiles will be supported at a uniform height, since the profile remains straight even if the flooring/ceiling structure is irregular.

[0020] The profile is provided with one or more abutment areas having an extension or being located along a second direction being orthogonal to the longitudinal direction. The abutment areas are adapted to abut the surface to which the profile is to be fastened and thereby prevent the profile from tilting about the longitudinal axis. The attachment portions allow movement at least partly in a third direction orthogonal to the longitudinal direction and to said second direction, i.e. towards the surface to which the profile is adapted to be fastened. If the profile is arranged with the longitudinal direction arranged horizontally, the second direction will be vertical and the third direction will be horizontal. If the profile is arranged with the longitudinal direction arranged vertical, the second direction will be horizontal and the third direction will be horizontal. If the profile is arranged with the longitudinal direction inclined, the second direction will be inclined and the third direction will be horizontal.

[0021] The profile may support at least one secondary profile.

[0022] Each of said at least two attachment portions may be formed as locally weakened portions of the profile. Due to the weakened portions, the bending resistance of the attachments portions is reduced compared to the rest of the profile. Thereby, the attachment portions become flexible and resilient in relation to the rest of the profile, and adapts to the irregularities of the wall while the profile remains straight.

[0023] Each of said at least two attachment portions may be weakened by being provided with at least one cut. The portion being cut reduces the strength of the attachment portion compared to the rest of the profile. Thereby, a resilient attachment portion is obtained. The cut may be formed by for example punching or cutting, which is a simple and cost-efficient production method. Alternatively, the cut may e.g. be obtained by laser-cutting or by water-cutting.

[0024] Said at least two attachment portions may comprise a tongue formed from the profile by a portion of the

profile being cut. By cutting a U-shaped cut of the profile, a tongue is formed which is connected to the rest of the profile on only one side. Thereby, the tongue is moveable and resilient in view of the portion of the tongue being connected to the rest of the profile.

[0025] The tongue may comprises a hole adapted to receive the fastening means. Thereby, a conventional fastening means may be inserted through the tongue-shaped attachment portion.

[0026] Said at least two attachment portions may be formed of a plurality of tongues together defining an opening through which the fastening means is adapted to extend.

[0027] Said at least two attachment portions may be formed of a plurality of symmetrically arranged cuts. Thereby, when applying a force on the attachment portion in a transverse direction pointing towards the surface, the attachment portion will be displaced in an essentially pure translational movement without any significant distortion or skewing.

[0028] Said at least two attachment portions may be formed of a symmetrical cut. Thereby, when applying a force on the attachment portion in a transverse direction pointing towards the surface, the attachment portion will be displaced in an essentially pure translational movement without any significant distortion or skewing.

[0029] The profile may comprise at least one reinforcement arranged adjacent said at least two attachment portions. The reinforcement increases the bending resistance of the profile such that the profile remains straight even when a force is applied to the attachment portions. Preferably the reinforcement has an extension in the longitudinal direction extending over the extension of the attachment portion in the longitudinal direction.

[0030] The profile may comprise a web and a flange, the web comprising said at least two attachments portions and being adapted to extend along said surface. Thereby, the profile may form a part of a grid for supporting a suspended ceiling, a wall, a floor or the like.

[0031] The profile may be adapted to support said at least one ceiling tile by means of said flange.

[0032] The profile may be made of sheet metal. This is a convenient way of continuously producing profiles.

[0033] Said cut or said cuts may be formed as a cut-out or cut-outs. By removing a portion or portions of the profile, the profile is locally weakened for forming an attachment portion.

[0034] According to a second aspect, the present invention is realised by a method for supporting a suspended ceiling is provided, comprising

providing a profile forming a part of a grid for supporting said suspended ceiling, the profile extending along a longitudinal direction and being adapted to extend along and to be fastened to a surface, the profile comprises at least two attachment portions, each attachment portion being adapted to receive a fastening means for fastening the profile to said surface,

wherein each of said at least two attachments portions is resilient in a direction being adapted to at least partly point towards said surface for accommodating to irregularities of said surface,

providing at least two fastening means,

fastening the profile to said surface by means of the fastening means engaging respective attachment portion and said surface, the resilient attachment portions accommodating to any irregularities of the surface,

supporting at least one ceiling tile made of compressed fibre material, such as mineral wool, by the profile.

[0035] An advantage of the inventive method is that the profile accommodates to or adjusts to any irregularities of the surface. Even if the surface, such as a wall, is not completely planar, the profile will remain straight after being fastened to the surface and will not follow the irregularities or the wave form of the surface.

[0036] When fastening the profile to the surface, the profile is adapted to abut the surface along its extension. If the surface is irregular or wave-formed, the profile only abuts top portions of the surface. At some positions, a gap may be formed between the profile and the surface. If the attachment portion is positioned where such a gap is formed, the attachment portion will move towards the surface due to its resilient properties when fastening the profile by means of the fastening means being received in the attachment portion. The attachment portion is then abutting the surface but the rest of the profile will be positioned at a distance from the surface. The profile will remain straight and will not move towards the surface since the bending resistance of the profile is larger compared to the resistance of the resilient attachment portion.

[0037] Thereby, any wobbling or twisting of the profile is reduced, since the profile remains straight even after being fastened to a surface which is irregular. Consequently, a supporting surface of the profile, such as a flange, will form a plane surface even after the profile is fastened to a surface which is irregular or wave-formed. Thereby, no gap will occur between the supporting surface of the profile and any tiles supported by the profile. Consequently, no shadows will occur between the profile and the tile, and the visual impression of the profile is improved.

[0038] Since a gap may be formed between the profile and the surface due to the irregularities of the surface, a shadow may be formed between the surface and the profile. This shadow is less marked compared to a shadow formed between the profile and a tile. In contrast to a gap formed between the profile and the tile, a gap formed between the profile and the surface may be disposed of, for example by covering it or filling it by adding a filler material between the profile and the surface.

[0039] When the profile remains straight, any tiles supported by the profile forms an edge being straight adjacent the profile. The edge formed by the tiles does not follow any irregularities of the surface but remains straight even if the surface is irregular, which improves the visual impression for a example a suspended ceiling supported by the profile.

[0040] When the profile does not follow any irregularities of the surface, and when the profile forms a plane support for tiles and/or a secondary profile, the profile visually hides the imperfections of the surface, and thereby improves the visual impression.

[0041] Additionally, the present inventions reduces the mechanical strain of the profile when attached to the surface and thereby reduces the risk of the profile being twisted due to releasing of stress originating from the forming of the profile.

[0042] Another advantage is that when the profile is used for supporting baffle tiles, the profile accommodates any irregularities of the flooring/ceiling structures and the upper side of the baffle tiles will form a straight line. When using the inventive profile, the baffle tiles will be supported at a uniform height, since the profile remains straight even if the flooring/ceiling structure is irregular.

Brief description of the drawings

[0043] The present invention will by way of example be described in more detail with reference to the appended schematic drawings, which show an embodiment of the present invention.

Fig 1a schematically illustrates a perspective view of a profile according to a first embodiment.

Fig 1b schematically illustrates a front view of the profile in fig 1a extending along a surface.

Fig 1c schematically illustrates a cross-section of the profile in figs 1a and 1b.

Fig 2a schematically illustrates a perspective view of an attachment portion in more detail according to said first embodiment.

Fig 2b schematically illustrates a front view of the attachment portion in fig 2a.

Fig 3a schematically illustrates the profile of said first embodiment being fastened to an irregular surface as seen from above.

Fig 3b schematically illustrates a portion of the profile in fig 3a shown in more detail.

Fig 4a-g schematically illustrates alternative embodiments of the attachment portion.

Fig 5a schematically illustrates a perspective view of a profile according to a second embodiment.

Fig 5b schematically illustrates a cross-section of the profile in fig 5a.

Detailed description

[0044] With reference to figs 1a-c, 2a-b and 3a-b, a profile 1 of a first embodiment will be described. The profile 1 extends in a longitudinal direction. The profile 1 is adapted to extend along a surface 5, such as a wall. The profile 1 is adapted to be fastened to the surface 5. The profile 1 comprises in this first embodiment a web 2 and a flange 3. The web 2 is adapted to extend along the surface 5. The web 2 extends in a vertical direction and the flange 3 extends in a horizontal direction as seen in the cross-section of the profile 1 shown in fig 1b.

[0045] The profile 1 may be made of sheet metal, plastic, aluminium, or any other suitable material.

[0046] The profile 1 is adapted to support at least one tile and/or support a secondary profile in turn being adapted to support at least one tile. The tile may be ceiling tile, a floor tile, a wall tile or the like.

[0047] The web 2 comprises at least two attachment portions 10. The attachment portions 10 are adapted to receive a fastening means of any conventional type, such as a screw 16 as shown in fig 3a-b,for fastening the profile 1 to the surface 5. The attachment portion 10 is formed as a locally weakened portion of the profile 1. The attachment portions 10 may be equidistantly arranged along the profile 1 in its longitudinal direction.

[0048] The attachment portion 10 comprises in this embodiment a tongue 11 having a hole 13 for receiving the fastening means, which is shown in more detail in figs 2a and 2b. The tongue 11 is formed by a portion of the web 2 being removed, for example by punching, or by cutting a portion of the web 2. The removed portion is in form of a U-shaped cut-out 12. As the attachment portion 10 only is connected to the profile 1 on one side, the attachment portion 10 is resilient in view of the rest of the profile 1. When a force is applied in on the attachment portion 10 in a direction transverse to the longitudinal direction and pointing towards the surface 5, the attachment portion 10 is resiliently moveable towards the surface 5.

[0049] The profile 1 will now be described when it is fastened to the surface 5 as shown in figs 3a and 3b. The profile 1 is extending along the surface 5 in the longitudinal direction. The profile 1 is fastened to the surface 5 by means of the fastening means 16. Since the surface 5 is irregular and wave-shaped, only portions of the profile 1 are abutting the surface 5. At some positions, a gap is formed between the profile 1 and the surface 5. As the attachment portions 10 are arranged along, preferably equidistantly along, the longitudinal extension of the profile 1, some of the attachment portions 10 may be positioned where a gap is formed between the profile 1 and the surface 5, which is shown in fig 3a and in more detail in fig 3b.

[0050] When fastening the profile 1 to the surface 5, the resilient properties of the attachment portions 10 will adjust to or accommodate the irregularities of the surface 5. When fastening the fastening means 16, the attachment portion 10 will move, due to its resilient properties, towards the surface 5 until the attachment portion 10 is abutting the surface 5. If no gap is formed between the profile 1 and the surface 5, the attachment portion 10 will remain in the plane of the web 2 as seen in figs 3a and 3b.

[0051] Due to the bending resistance of the profile 1 in its longitudinal direction is larger than the resistance of the weakened attachment portions 10, the profile 1 will remain straight even if the surface 5 is irregular or wave-formed. No twisting of the profile 1 will occur. However,

the attachment portions 10 will adapt to the irregularities of the surface 5 by being resilient in the direction being transverse to the longitudinal direction and pointing towards the surface 5.

[0052] The weakened portion of the attachment portion may be obtained in many different ways. Other embodiments of the attachment portion 10 are shown in figs 4a-4g. In fig 4a, the attachment portion 110 comprises a tongue 111 formed by a U-shaped cut-out 112 and a hole 113 for receiving a fastening means as previously described. In contrast to the previously described embodiment, the tongue 111 is connected to a portion of the web 102 adjacent the flange. In the previously described embodiment and in the embodiment shown in fig 4a, the attachment portion 110 will move about the portion being connected to the profile 1.

[0053] In fig 4b, the attachment portion 210 comprises a hole 213 for receiving the fastening means and four cut-outs 212a-212d symmetrically arranged about the hole 213. Since the cut-outs 212a-12d are symmetrically arranged, the attachment portion 210 will move in a direction being transverse to the longitudinal direction and towards the surface 5 when fastening the fastening means if a gap is formed between the profile 1 and the surface 5. The central portion will be imposed a pure transverse translational movement since the bending of the remaining material between the cut-outs will in all directions occur in the same manner at opposing sides of the hole 213.

[0054] In fig 4c, the attachment portion 310 comprises four tongues 311a-d.

The tongues 311a-d are formed by a portion of the web 2 being removed. The removed portion is formed as a symmetrically formed cut-out 312 being formed of four portions 312a-d. A centre portion 313 of the cut-out 312 forms a hole adapted to receive the fastening means. Since the cut-out 312 is symmetric, the attachment portion 310 will move in a direction being transverse to the longitudinal direction and towards the surface 5 when fastening the fastening means if a gap is formed between the profile 1 and the surface 5.

[0055] Fig 4d discloses an attachment portion 410 comprising a cut-out 412.

The cut-out 412 has a shape as a horizontally laid H. A centre portion 413 of the attachment portion 410 is adapted to receive a fastening means. Since the cut-out 412 is symmetric, the attachment portion 140 will move in a direction being transverse to the longitudinal direction and towards the surface 5 when fastening the fastening means, if a gap is formed between the profile 1 and the surface 5. As an alternative to a horizontally laid H, a vertically standing H is also possible.

[0056] Fig 4e shows an attachment portion 510 comprising four cut outs 512a-12d and a hole 513, which is adapted to receive a fastening means and is arranged in the centre of the attachment portion 510. The four cut-outs 12a-d are symmetrically arranged about the hole 513. Since the cut-outs 512a-d are symmetrically arranged, the attachment portion 50 will move in a direction being transverse to the longitudinal direction and towards the surface 5 when fastening the fastening means if a gap is formed between the profile 1 and the surface 5.

[0057] Fig 4f discloses an attachment portion 610 comprising a cut-out 612.

The shape of the cut-out 612 is similar as the cut-out in the embodiment shown in fig 4d, i.e. the cut-out 612 has a shape as a horizontally laid H. The centre portion 613 of the cut-out 612 is adapted to receive a fastening means. Adjacent the attachment portion 610, two reinforcements 614, 615 are arranged. The reinforcements 614, 615 increases the bending resistance of the profile 1 adjacent the attachment portion 610 such that the profile 1 will remain straight when a force is applied on the attachment portion 610. In fig 4f, the reinforcements 614, 615 are shown together with a horizontally laid H, but reinforcements may be arranged adjacent any other type of attachment portion.

[0058] All the disclosed embodiments of the attachment portion have in common that they are weakened compared to the rest of the profile 1 for forming a resilient portion. Therefore, when applying a force on the attachment portion 10, the attachment portion 10 will resiliently move towards the surface 5. The profile 1 will remain straight since the bending resistance is larger compared to the resistance of the attachment portions 10.

[0059] In the previously described embodiment, the profile 1 has been an L-profile. However, the present invention is not restricted to an L-profile. The profile may have any shape. In figs 5a and 5a, a U-shaped profile 1' is shown. The profile 1' in this embodiment comprises a first web 2, a flange 3 and a second web 4. In the embodiment in figs 5a and 5b, the first and second web 2, 4 are extending in a vertical direction and the flange 3 is extending in a horizontal direction. The first web 2 comprises at least two attachment portions 10. In the embodiment shown in fig 5a, the attachment portion 10 comprises a tongue 11 having a hole 13 for receiving a fastening means. The tongue 11 is formed by a U-shaped portion of the profile 1' being removed, for example by punching.

[0060] It is contemplated that there are numerous modifications of the embodiments described herein, which are still within the scope of the invention as defined by the appended claims.

[0061] For example, it is contemplated that a single profile may comprise different types of attachments portions. Different types of the attachment portions may be specially adapted to suit different surface properties. In the embodiment shown in for example fig 1a, the profile comprises only one type of attachment portions being formed of a tongue. As an alternative, the profile may comprise different types of attachments portions arranged along the longitudinal direction of the profile such that a specific design of the attachment portion may be used depending on the properties of the surface.

[0062] Further, the type of attachment portion may also

be adjusted to suit different shapes, sizes and type of fastening means.

[0063] It is also contemplated that any of the different attachment portions may be used on any kind of profile, including not only the L- and U-profiles disclosed. The design of the attachment portions are especially suitable for any kind profile comprising a web adapted to extend along the surface to which the profile is adapted to be fastened.

Embodiments

[0064] Item 1: A profile (1; 1') extending along a longitudinal direction and being adapted to extend along and to be fastened to a surface (5), the profile (1; 1') comprises at least two attachment portions (10; 110; 210; 310; 410; 510; 610), each attachment portion (10; 110; 210; 310; 410; 510; 610) being adapted to receive a fastening means (16) for fastening the profile (1; 1') to said surface (5),
wherein each of said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) is resilient in a direction being adapted to at least partly point towards said surface (5) for accommodating to any irregularities of said surface (5).

[0065] The profile may be adapted to support at least one tile and/or a secondary profile in turn being adapted to support at least one tile. The tile may be a ceiling tile, a floor tile, a wall tile or the like. The invention is especially suited for ceiling tiles, for example ceiling tiles made of compressed fibre material, such as mineral wool. The tile may, for example, be a sound absorber having sound-absorbing properties, and/or may be a sound-insulation element preventing sound from leaking from one room to another.

[0066] An advantage of the present invention is that the profile accommodates to or adjusts to any irregularities of the surface. Even if the surface, such as a wall, is not completely planar, the profile will remain straight after being fastened to the surface and will not follow the irregularities or the wave form of the surface.

[0067] The profile is adapted to abut the surface along its longitudinal extension. If the surface is irregular or wave-formed, the profile abuts only top portions of the surface. At some positions, a gap may be formed between the profile and the surface. If the attachment portion is positioned where such a gap is formed, the attachment portion will move towards the surface due to its resilient properties when fastening the profile by means of the fastening means being received in the attachment portion. The attachment portion is then abutting the surface but the rest of the profile will be positioned at a distance from the surface. The profile will remain straight and will not move towards the surface since the bending resistance of the profile is larger compared to the resistance of the resilient attachment portion.

[0068] Thereby, any wobbling or twisting of the profile is reduced, since the profile remains straight even after being fastened to a surface which is irregular. Consequently, a supporting surface of the profile, such as a flange, will form a plane surface even after the profile is fastened to a surface which is irregular or wave-formed. Thereby, no gap will occur between the supporting surface of the profile and any tiles supported by the profile. Consequently, no shadows will occur between the profile and the tiles, and the visual impression of the profile is improved.

[0069] Since a gap may be formed between the profile and the surface due to the irregularities of the surface, a shadow may be formed between the surface and the profile. This shadow is less marked compared to a shadow formed between the profile and a tile. In contrast to a gap formed between the profile and the tile, a gap formed between the profile and the surface may be disposed of, for example by covering it or filling it by adding a filler material between the profile and the surface.

[0070] When the profile remains straight, any tiles supported by the profile forms an edge being straight adjacent the profile. The edge formed by the tiles does not follow any irregularities of the surface but remains straight even if the surface is irregular, which improves the visual impression for a example a suspended ceiling supported by the profile.

[0071] When the profile does not follow any irregularities of the surface, and when the profile forms a plane support for tiles and/or a secondary profile, the profile visually hides the imperfections of the surface, and thereby improves the visual impression.

[0072] Additionally, the present inventions reduces the mechanical strain of the profile when attached to the surface and thereby reduces the risk of the profile being twisted due to releasing of stress originating from the forming of the profile.

[0073] Another advantage is that when the profile is used for supporting baffle tiles, the profile accommodates any irregularities of the flooring/ceiling structures and the upper side of the baffle tiles will form a straight line. When using the inventive profile, the baffle tiles will be supported at a uniform height, since the profile remains straight even if the flooring/ceiling structure is irregular.

[0074] The profile is provided with one or more abutment areas having an extension or being located along a second direction being orthogonal to the longitudinal direction. The abutment areas are adapted to abut the surface to which the profile is to be fastened and thereby prevent the profile from tilting about the longitudinal axis. The attachment portions allow movement at least partly in a third direction orthogonal to the longitudinal direction and to said second direction, i.e. towards the surface to which the profile is adapted to be fastened. If the profile is arranged with the longitudinal direction arranged horizontally, the second direction will be vertical and the third direction will be horizontal. If the profile is arranged with the longitudinal direction arranged vertical, the second direction will be horizontal and the third direction will be horizontal. If the profile is arranged with the longitudinal

direction inclined, the second direction will be inclined and the third direction will be horizontal.

[0075] Item 2: A profile (1; 1') according to item 1, wherein each of said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) is formed as locally weakened portions of the profile (1, 1'). Due to the weakened portions, the bending resistance of the attachments portions is reduced compared to the rest of the profile. Thereby, the attachment portions become flexible and resilient in relation to the rest of the profile, and adapts to the irregularities of the wall while the profile remains straight.

[0076] Item 3: A profile (1; 1') according to item 1 or item 2, wherein each of said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) is weakened by being provided with at least one cut. The portion being cut reduces the strength of the attachment portion compared to the rest of the profile. Thereby, a resilient attachment portion is obtained. The cut may be formed by for example punching or cutting, which is a simple and cost-efficient production method. Alternatively, the cut may e.g. be obtained by laser-cutting or by water-cutting.

[0077] Item 4: A profile (1; 1') according to any one of items 1-3, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) comprise a tongue (11; 111) formed from the profile (1, 1') by a portion of the profile (1, 1') being cut. By cutting a U-shaped cut of the profile, a tongue is formed which is connected to the rest of the profile on only one side. Thereby, the tongue is moveable and resilient in view of the portion of the tongue being connected to the rest of the profile.

[0078] Item 5: A profile (1, 1') according to item 4, wherein the tongue (11; 111) comprises a hole (13; 113; 213; 313; 413; 513; 613) adapted to receive the fastening means. Thereby, a conventional fastening means may be inserted through the tongue-shaped attachment portion.

[0079] Item 6: A profile (1, 1') according to any one of items 1-5, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a plurality of tongues (311a-d) together defining an opening through which the fastening means is adapted to extend.

[0080] Item 7: A profile (1; 1') according to any one of items 1-6, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a plurality of symmetrically arranged cuts (212a-d; 512a-d). Thereby, when applying a force on the attachment portion in a transverse direction pointing towards the surface, the attachment portion will be displaced in an essentially pure translational movement without any significant distortion or skewing.

[0081] Item 8: A profile (1,1') according to any one of items 1-6, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a symmetrical cut (312; 412; 612). Thereby, when applying a force on the attachment portion in a transverse direction pointing towards the surface, the attachment portion will be displaced in an essentially pure translational movement without any significant distortion or skewing.

[0082] Item 9: A profile (1;1') according to any one of items 1-8, further comprising at least one reinforcement (614, 615) arranged adjacent said at least two attachment portions (10; 110; 210; 310; 410; 510; 610). The reinforcement increases the bending resistance of the profile such that the profile remains straight even when a force is applied to the attachment portions. Preferably the reinforcement has an extension in the longitudinal direction extending over the extension of the attachment portion in the longitudinal direction.

[0083] Item 10: A profile (1; 1') according to any one of items 1-9, wherein the profile (1,1') comprises a web (2) and a flange (3), the web (2) comprising said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) and being adapted to extend along said surface (5). Thereby, the profile may form a part of a grid for supporting a suspended ceiling, a wall, a floor or the like.

[0084] Item 11: A profile (1; 1') according to item 10, wherein the flange (3) is adapted to support at least one tile and/or at least one secondary profile.

[0085] Item 12: A profile (1, 1') according to any one of items 1-11, wherein the profile (1, 1') is made of sheet metal. This is a convenient way of continuously producing profiles.

[0086] Item 13: A profile (1; 1') according to any one of items 1-12, wherein said cut or said cuts are formed as a cut-out or cut-outs. By removing a portion or portions of the profile, the profile is locally weakened for forming an attachment portion.

[0087] Item 14: A method for fastening a profile (1, 1') to a surface (5), comprising

providing a profile (1, 1') extending along a longitudinal direction and being adapted to extend along and to be fastened to a surface (5), the profile (1, 1') comprises at least two attachment portions (10; 110; 210; 310; 410; 510; 610), each attachment portion (10; 110; 210; 310; 410; 510; 610) being adapted to receive a fastening means (16) for fastening the profile to said surface (5), wherein each of said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) is resilient in a direction being adapted to at least partly point towards said surface (5) for accommodating to irregularities of said surface (5), providing at least two fastening means (16),

fastening the profile (1, 1') to said surface (5) by means of the fastening means (16) engaging respective attachment portion (10; 110; 210; 310; 410; 510; 610) and said surface (5), the resilient attachment portions (10; 110; 210; 310; 410; 510; 610) accommodating to any irregularities of the surface (5).

[0088] An advantage of the inventive method is that the profile accommodates to or adjusts to any irregularities of the surface. Even if the surface, such as a wall, is not completely planar, the profile will remain straight after being fastened to the surface and will not follow the irregularities or the wave form of the surface.

[0089] When fastening the profile to the surface, the profile is adapted to abut the surface along its extension.

If the surface is irregular or wave-formed, the profile only abuts top portions of the surface. At some positions, a gap may be formed between the profile and the surface. If the attachment portion is positioned where such a gap is formed, the attachment portion will move towards the surface due to its resilient properties when fastening the profile by means of the fastening means being received in the attachment portion. The attachment portion is then abutting the surface but the rest of the profile will be positioned at a distance from the surface. The profile will remain straight and will not move towards the surface since the bending resistance of the profile is larger compared to the resistance of the resilient attachment portion.

[0090] Thereby, any wobbling or twisting of the profile is reduced, since the profile remains straight even after being fastened to a surface which is irregular. Consequently, a supporting surface of the profile, such as a flange, will form a plane surface even after the profile is fastened to a surface which is irregular or wave-formed. Thereby, no gap will occur between the supporting surface of the profile and any tiles supported by the profile. Consequently, no shadows will occur between the profile and the tile, and the visual impression of the profile is improved.

[0091] Since a gap may be formed between the profile and the surface due to the irregularities of the surface, a shadow may be formed between the surface and the profile. This shadow is less marked compared to a shadow formed between the profile and a tile. In contrast to a gap formed between the profile and the tile, a gap formed between the profile and the surface may be disposed of, for example by covering it or filling it by adding a filler material between the profile and the surface.

[0092] When the profile remains straight, any tiles supported by the profile forms an edge being straight adjacent the profile. The edge formed by the tiles does not follow any irregularities of the surface but remains straight even if the surface is irregular, which improves the visual impression for a example a suspended ceiling supported by the profile.

[0093] When the profile does not follow any irregularities of the surface, and when the profile forms a plane support for tiles and/or a secondary profile, the profile visually hides the imperfections of the surface, and thereby improves the visual impression.

[0094] Additionally, the present inventions reduces the mechanical strain of the profile when attached to the surface and thereby reduces the risk of the profile being twisted due to releasing of stress originating from the forming of the profile.

[0095] Another advantage is that when the profile is used for supporting baffle tiles, the profile accommodates any irregularities of the flooring/ceiling structures and the upper side of the baffle tiles will form a straight line. When using the inventive profile, the baffle tiles will be supported at a uniform height, since the profile remains straight even if the flooring/ceiling structure is irregular.

Claims

1. A suspended ceiling comprising a profile (1; 1') and at least one ceiling tile made of compressed fibre material, such as mineral wool,
the profile (1; 1') forming part of a grid for supporting said suspended ceiling,
wherein the profile (1; 1') comprises at least two attachment portions (10; 110; 210; 310; 410; 510; 610), each attachment portion (10; 110; 210; 310; 410; 510; 610) being adapted to receive a fastening means (16) for fastening the profile (1; 1') to said surface (5),
wherein each of said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) is resilient in a direction being adapted to at least partly point towards said surface (5) for accommodating to any irregularities of said surface (5), and
wherein the profile (1; 1') supports said at least one ceiling tile.

2. A suspended ceiling according to claim 1, wherein the profile (1; 1') supports at least one secondary profile.

3. A suspended ceiling according to claim 1 or claim 2, wherein each of said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) is formed as locally weakened portions of the profile (1; 1').

4. A suspended ceiling according to any one of claims 1-3, wherein each of said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) is weakened by being provided with at least one cut.

5. A suspended ceiling according to any one of claims 1-4, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) comprise a tongue (11; 111) formed from the profile (1; 1') by a portion of the profile (1; 1') being cut.

6. A suspended ceiling according to claim 5, wherein the tongue (11; 111) comprises a hole (13; 113; 213; 313; 413; 513; 613) adapted to receive the fastening means.

7. A suspended ceiling according to any one of claims 1-6, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a plurality of tongues (311a-d) together defining an opening through which the fastening means is adapted to extend.

8. A suspended ceiling according to any one of claims 1-7, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a plurality of symmetrically arranged cuts (212a-d; 512a-d).

9. A suspended ceiling according to any one of claims 1-7, wherein said at least two attachment portions (10; 110; 210; 310; 410; 510; 610) are formed of a symmetrical cut (312; 412; 612).

10. A suspended ceiling according to any one of claims 1-9, wherein the profile comprises at least one reinforcement (614, 515) arranged adjacent said at least two attachment portions (10; 110; 210; 310; 410; 510; 610).

11. A suspended ceiling according to any one of claims 1-10,
wherein the profile (1, 1') comprises a web (2) and a flange (3), the web (2) comprising said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) and being adapted to extend along said surface (5).

12. A suspended ceiling according to claim 11, wherein the profile (1; 1') is adapted to support said at least one ceiling tile by means of said flange (3).

13. A suspended ceiling according to any one of claims 1-12,
wherein the profile (1; 1') is made of sheet metal.

14. A suspended ceiling according to any one of claims 1-13,
wherein said cut or said cuts are formed as a cut-out or cut-outs.

15. A method for supporting a suspended ceiling, comprising
providing a profile (1; 1') forming a part of a grid for supporting said suspended ceiling, the profile (1; 1') extending along a longitudinal direction and being adapted to extend along and to be fastened to a surface (5), the profile (1; 1') comprises at least two attachment portions (10; 110; 210; 310; 410; 510; 610), each attachment portion (10; 110; 210; 310; 410; 510; 610) being adapted to receive a fastening means (16) for fastening the profile to said surface (5), wherein each of said at least two attachments portions (10; 110; 210; 310; 410; 510; 610) is resilient in a direction being adapted to at least partly point towards said surface (5) for accommodating to irregularities of said surface (5),
providing at least two fastening means (16),
fastening the profile (1; 1') to said surface (5) by means of the fastening means (16) engaging respective attachment portion (10; 110; 210; 310; 410; 510; 610) and said surface (5), the resilient attachment portions (10; 110; 210; 310; 410; 510; 610) accommodating to any irregularities of the surface (5),
supporting at least one ceiling tile made of compressed fibre material, such as mineral wool, by the profile (1; 1').

Fig 1a

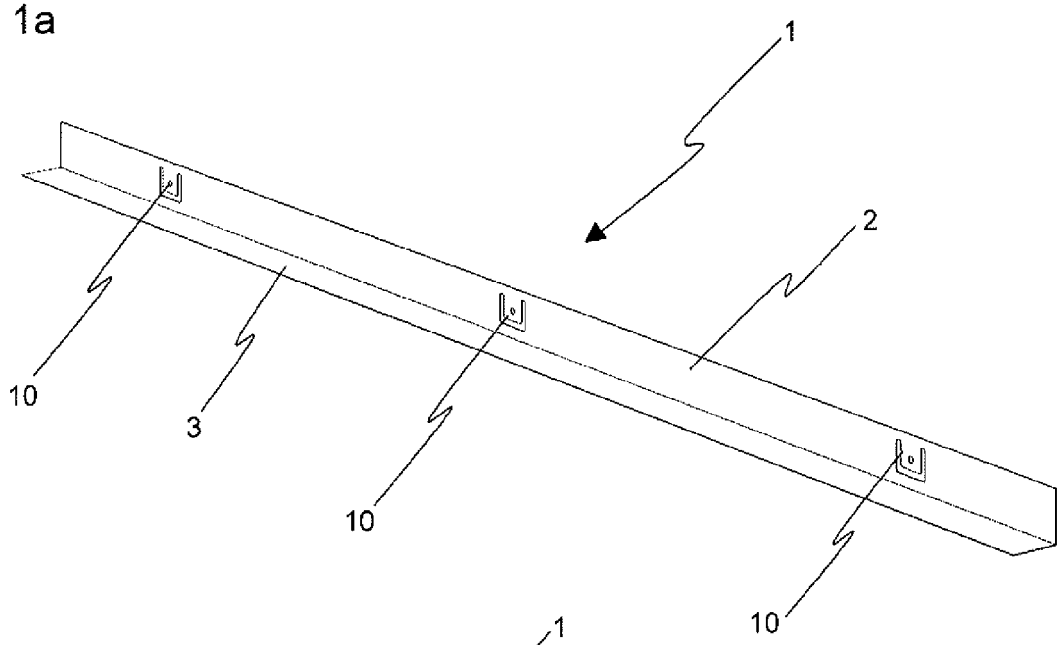


Fig 1b

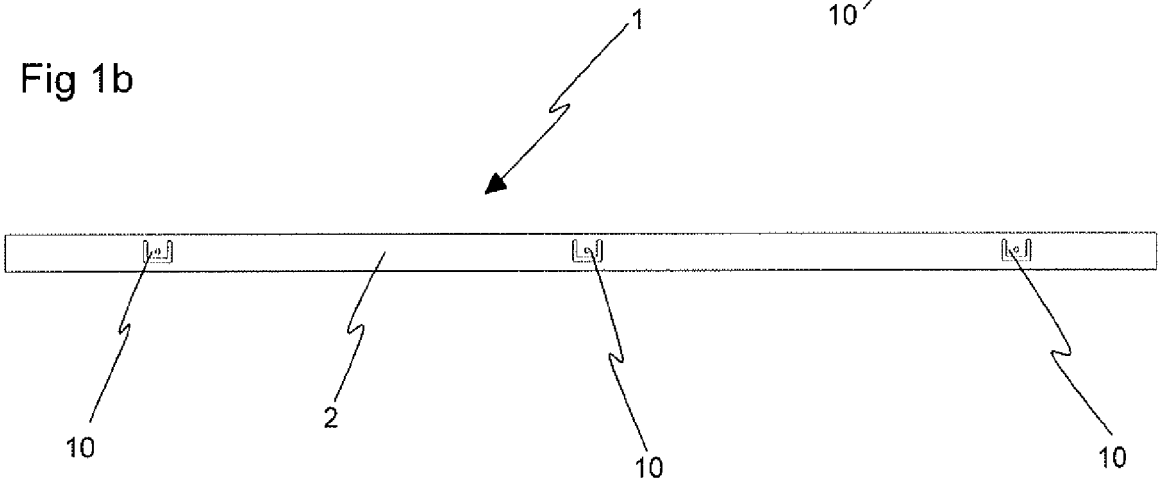


Fig 1c

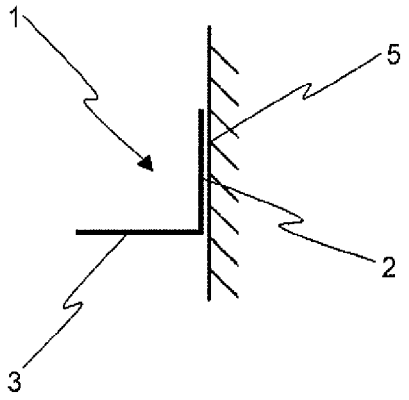


Fig 2a

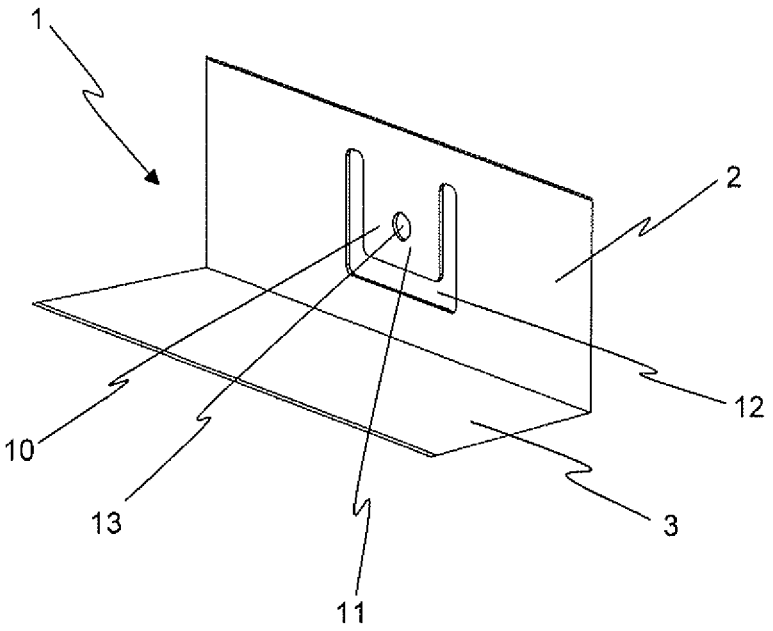


Fig 2b

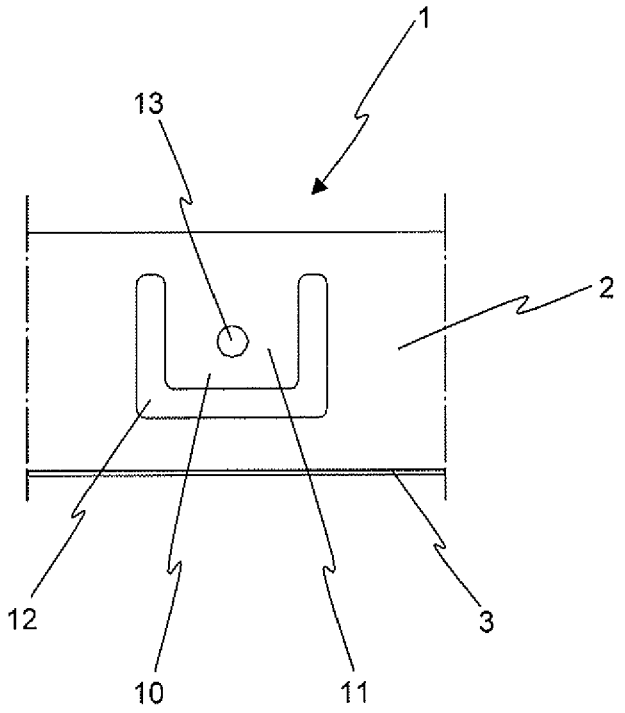


Fig 3a

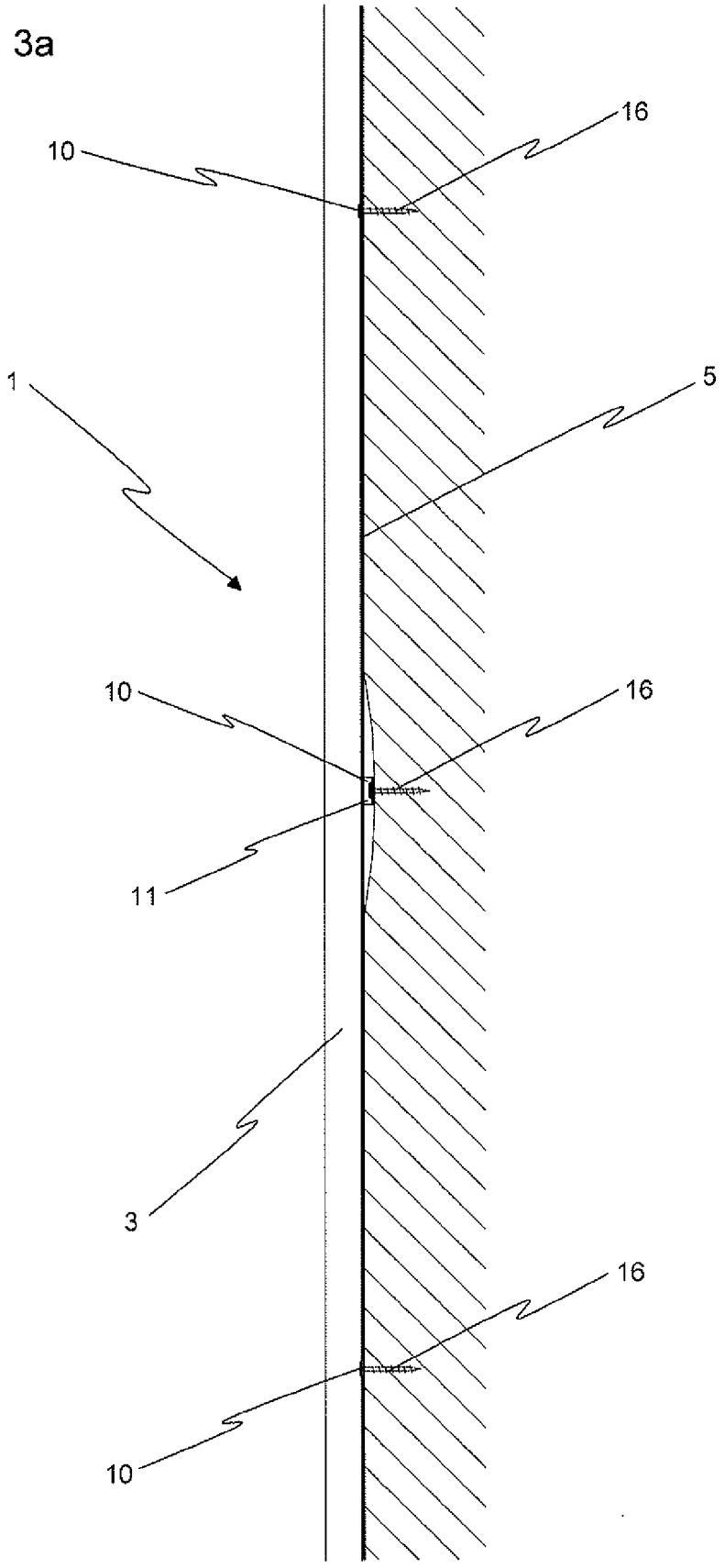


Fig 3b

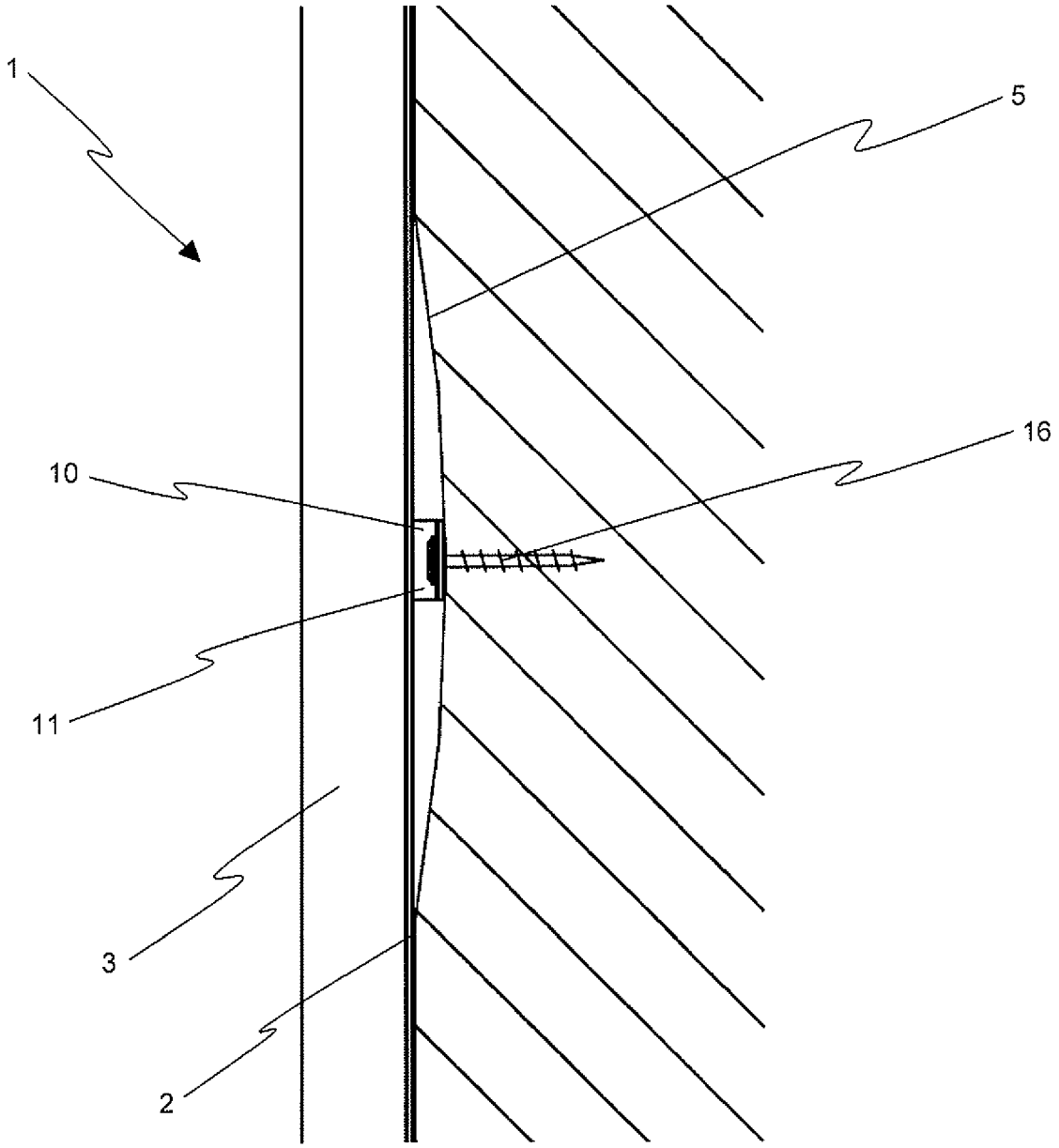


Fig 4a

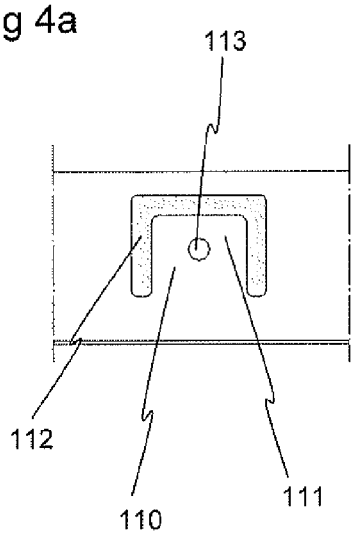


Fig 4d

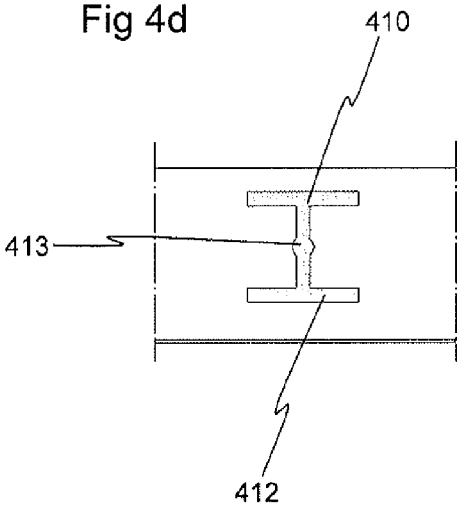


Fig 4b

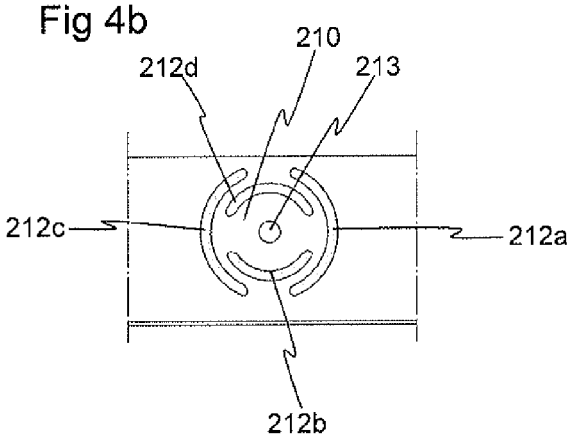


Fig 4e

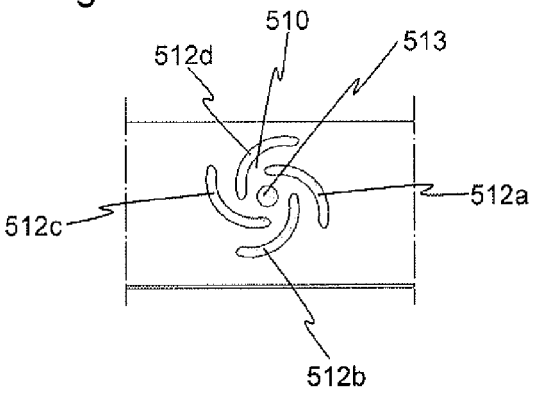


Fig 4c

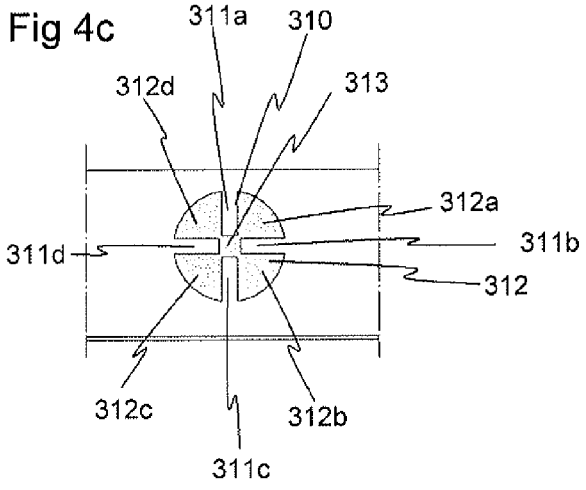


Fig 4f

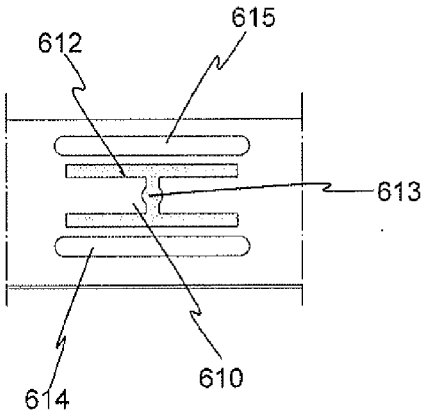


Fig 5a

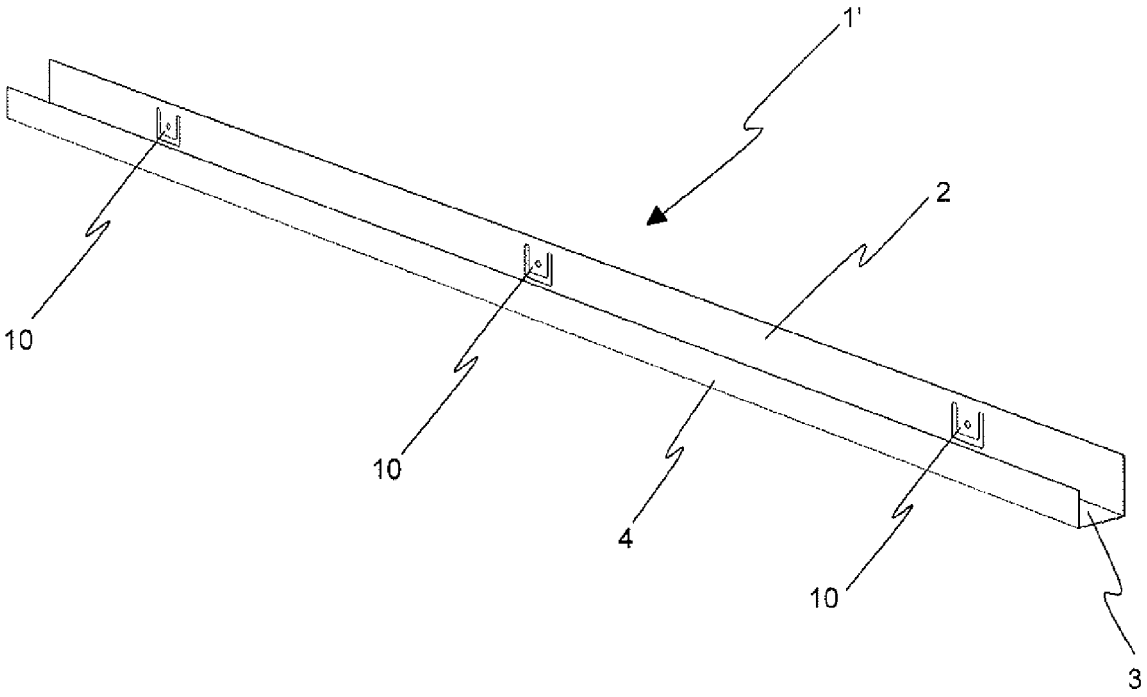
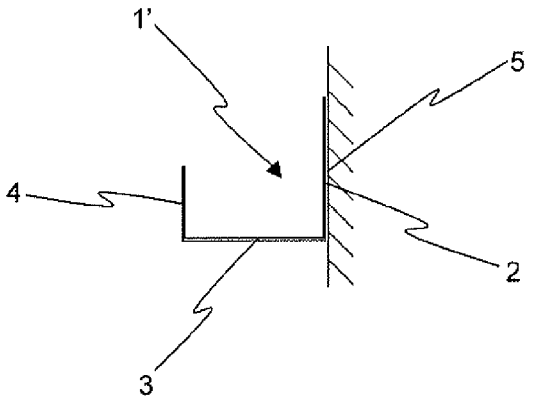


Fig 5b



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- FR 2740800 **[0007]**