



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.08.2021 Bulletin 2021/32

(51) Int Cl.:
E04B 9/12 (2006.01)

(21) Application number: **20155420.1**

(22) Date of filing: **04.02.2020**

(84) Designated Contracting States:
**AL 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 RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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

(72) Inventor: **Nilsson, Thomas**
252 49 Helsingborg (SE)

(74) Representative: **AWA Sweden AB**
P.O. Box 5117
200 71 Malmö (SE)

(54) **A SECONDARY PROFILE CONNECTOR FOR A SUSPENDED CEILING SYSTEM**

(57) A secondary profile connector (100) for a suspended ceiling system (1000) comprising a secondary profile (300) associated with the secondary profile connector (100) and a primary profile (200) having a web (202) provided with an opening (204) for reception of the secondary profile connector (100), the secondary profile

connector (100) comprising a tongue arrangement (102) insertable into the opening (204) of the web (202) of the primary profile (200) for releasable connection of the secondary profile connector (100) to the primary profile (200).

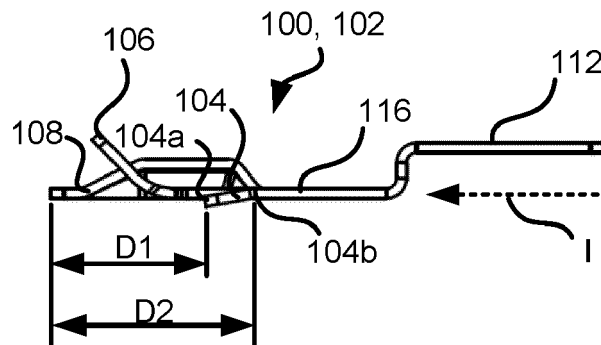


Fig. 1b

Description

Field of the invention

[0001] The present invention relates to suspended ceiling systems and more specifically to a connector for suspended ceiling systems.

Background art

[0002] Suspended ceiling systems are used in many different types of buildings e.g. to lower the ceiling, to provide sound dampening, to facilitate mounting of light sources and other building equipment and to provide an aesthetically pleasing interior ceiling. Suspended ceiling systems, as the name implies, are attached to a supporting structure of some sort, such as the ceiling structure of the building. Suspended ceiling systems usually comprises a plurality of ceiling tiles and a supporting structure in form of a grid. The grid comprises profiles which support the ceiling tiles. The grid often comprises main profiles forming the structural, load bearing structure of the grid which are connected to the ceiling. The main profiles are moreover often interconnected by cross profiles which are connected to the main profiles and together forms a grip patterning into which for instance ceiling tiles can be arranged.

[0003] The ceiling tiles may have sound-absorbing and/or sound-insulating properties in order to improve the acoustic environment of the room. In order to obtain a lightweight ceiling with satisfactory sound absorption, the tiles, for instance, may be made of a compressed fibre material such as mineral wool and especially glass wool. In addition to ceiling tiles, the profiles may also support various equipment such as lighting devices, ventilation equipment, inspection openings, detectors, cable trays, loudspeakers, signs, sprinklers etc.

[0004] Manufacturers of suspended ceiling systems continuously strive to improve the safety of the systems and, as with other equipment that is installed in public/residential buildings, suspended ceilings systems are subject to a number of safety requirements to be fulfilled for instance in case of fire. As an example, the suspended ceiling system may be of considerable weight, especially when taking into account the equipment that may be attached thereto. It is thus desired that the suspended ceiling system is not too rapidly adversely affected by the heat from a fire, and that it can withstand such circumstances at least for a certain period of time. It is also desired that equipment supported by the suspended ceiling systems does not fall in case of fire, as this not only causes a hazard to eventual persons being present below the ceiling, but also in that it may cause an obstacle for rescue/firefighting personnel trying to access the building.

Summary of the invention

[0005] In view of that stated above, the object of the present invention is to provide a secondary profile connector and a suspended ceiling system which mitigates some of the problems with prior art.

[0006] To achieve at least one of the above objects and also other objects that will be evident from the following description, a secondary profile connector having the features defined in claim 1 and a suspended ceiling system having the features defined in claim 6 are provided according to the present invention. Preferred embodiments of the device will be evident from the dependent claims.

[0007] More specifically, there is provided according to a first aspect of the present invention a secondary profile connector for a suspended ceiling system comprising a secondary profile associated with the secondary profile connector and a primary profile having a web provided with an opening for reception of the secondary profile connector. The secondary profile connector comprises a tongue arrangement insertable into the opening of the web of the primary profile for releasable connection of the secondary profile connector to the primary profile. The tongue arrangement comprises a tab portion which, in a connected state of the secondary profile connector, is configured to abut an insertion side of the web for defining a first insertion depth for the secondary profile connector. The tab portion is configured to be deformed in response to being pressed against the insertion side of the web with a force exceeding a threshold value for defining a second insertion depth while maintaining engagement with the insertion side of the web, the second insertion depth being greater than the first insertion depth. Longitudinal expansions of the secondary profile can thus be absorbed by the tab portions, which deforms elastically and/or plastically when the force exceeds the threshold value. This prevents unwanted elevated mechanical stress levels occurring in the joints between the profiles, which could cause failure thereof. Moreover, it facilitates keeping the desired shape of the suspended ceiling system which is formed by a number of primary and secondary profiles.

[0008] The tab portion may further be defined by a slit extending in a longitudinal direction of the secondary profile connector. The slit facilitates reliable deformation of the tab portion, reduces the risk of tab portion deformation affecting the tongue arrangement and defines the maximum insertion depth of the secondary profile connector.

[0009] Furthermore, the tab portion may comprise a distal end section which is configured to abut against the web in a position that does not coincide with a plane that is defined by the extension of a tongue arrangement base portion from which the tab portion extends. The tongue arrangement base portion preferably extends in a plane parallel with the insertion direction of the secondary profile connector. The above arrangement provides a tab portion which bends laterally upon being exerted to a

force higher than the threshold value and that is uncomplicated to manufacture.

[0010] Further still, the tab portion may comprise a distal end section which is configured to abut against the web in a position that coincides with a plane that is defined by the extension of a tongue arrangement base portion from which the tab portion extends. A reduction in the bending moment generated by the deformation of the tab portion is thus achieved, which reduces eventual deformation of the secondary profile connector caused by said bending moment.

[0011] The tongue arrangement may further comprise a tongue configured for resilient lateral displacement in response to being subjected to a lateral force and comprising a hook member. The hook member, in the connected state of the secondary profile connector, is configured for a hooked engagement with a corresponding hook member of a secondary profile connector inserted into the opening from the opposite side of the web. The hook member provides an improved safety in the connection between the secondary profile connectors, reducing the risk of unintentional release of the connection. By the hook members resiliently snapping into engagement with each other during connection of two secondary profile connectors, no additional assembly or tools are required for achieving the improved safety.

[0012] In a second aspect of the invention is a suspended ceiling system provided which comprises a secondary profile connector according to the first aspect, a secondary profile associated with the secondary profile connector and a primary profile having a web provided with an opening. The secondary profile is releasably connectable to the primary profile by insertion of the secondary profile connector associated with the secondary profile into the opening in the web.

[0013] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

Brief description of the drawings

[0014] The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Figs 1a and 1b discloses a side and top view respectively of a secondary profile connector according to

one embodiment.

Figs 2a and 2b discloses a side and top view respectively of a secondary profile connector according to one embodiment.

Figs 3a and 3b discloses a side and top view respectively of a secondary profile connector according to one embodiment.

Figs 4a and 4b discloses a side and top view respectively of a secondary profile connector according to one embodiment.

Fig. 5a discloses a perspective view of a suspended ceiling system according to one embodiment.

Fig. 5b discloses a detail view A of the mutual engagement of hook members in Fig. 5a.

Fig. 6 discloses a top view of two secondary profile connectors according to one embodiment in a connected state.

Fig. 7 discloses a side view of a suspended ceiling system according to one embodiment.

Fig. 8 discloses a perspective view of a suspended ceiling system according to one embodiment.

Fig. 9 discloses a perspective view of a secondary profile connector integral to a secondary profile according to one embodiment.

Fig. 10 discloses a top view of a secondary profile connector according to one embodiment.

Fig. 11 discloses a top view of a secondary profile connector according to one embodiment.

Description of embodiments

[0015] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which currently preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided for thoroughness and completeness, and fully convey the scope of the invention to the skilled person.

[0016] Referring firstly to Figs 1a and 1b, in which a secondary profile connector 100 is shown in a side and top view respectively. The secondary profile connector 100 is configured to be attached to a secondary profile 300, as shown in for example Fig. 8, and allow attachment thereof to a primary profile 200 and/or to another secondary profile 300. The secondary profile connector 100 may be formed as a separate part that is connectable to the secondary profile 300 or as an integral part of the secondary profile 300 itself. The secondary profile connector 100 is preferably manufactured from a metallic material such as steel, for example spring steel or stainless steel, or aluminium but other materials are also considered. The material of the secondary profile connector 100 should preferably have a high thermal resistance, and thus be able to withstand high temperatures. The material should also be such that the secondary profile connector 100 is deformable to a certain extent without

suffering from a brittle fracture or other types of failures that may result in a release of the connection formed by the connector 100. Preferably, the secondary profile connector 100 is made in one piece for instance by stamping and/or punching.

[0017] In the context of the present disclosure, a primary profile 200 is to be seen as a profile in a suspended ceiling system which is connected/suspended to/from the ceiling and a secondary profile 300 is in turn connected to and/or suspended by the primary profile 200. Preferably, the primary and secondary profiles 200, 300 are perpendicularly arranged in relation to one another such that they form a grid of profiles which can support for instance ceiling tiles and/or equipment such as ventilation devices, light sources etc.

[0018] However, it is also conceivable that also the secondary profile 300 is connected/suspended to/from the ceiling.

[0019] The secondary profile connector 100 comprises a tongue arrangement 102, the tongue arrangement 102 being configured to be received by an opening 204 in a web 202 of the primary profile (as shown in Fig. 8). The secondary profile connector 100 is inserted in the opening 204 in the insertion direction I, which is parallel with the longitudinal extension of the secondary profile 300. The tongue arrangement 102 provides a releasable connection between the secondary profile connector 100 and the primary profile 200 and/or another secondary profile 300.

[0020] Moreover, the tongue arrangement 102 comprises a tab portion 104 which, in a connected state of the secondary profile connector 100, is configured to abut an insertion side of the web 202 for defining a first insertion depth D1 for the secondary profile connector 100. The secondary profile 300 is during normal assembly inserted into the opening 204 in the web 202 until the tab portion 104 abuts the web 202. This defines the first insertion depth D1.

[0021] In certain situations, the secondary profiles 300 may be subject to thermal longitudinal expansion. The longitudinal expansion is especially critical to take into consideration in applications using a plurality of longitudinally arranged secondary profiles 300 and/or during extreme temperatures such as during a fire. Thermal expansion of an elongated profile is related to material thereof and to the length of the profile, which is effectively extended by each profile that is arranged longitudinally end-to-end one after the other. In such circumstances, thermal expansion could cause the grid of profiles in a suspended ceiling system to be deformed to the point where ceiling tiles and/or the profiles themselves become detached and falls from the suspended ceiling system.

[0022] Avoiding such situations is achieved in the present disclosure by that the tab portion 104 is configured to be deformed in response to being pressed against the insertion side of the web 202 with a force exceeding a threshold value. When the force exceeds the threshold

value, the secondary profile connector 100 is pressed into a second insertion depth D2 while maintaining engagement with the insertion side of the web 202 as the tab portion 104 deforms. The second insertion depth D2 is greater than the first insertion depth D1. The deformable tab portion 104 can thus accommodate a certain degree of longitudinal expansion of each secondary profile 300, specifically the distance of D2-D1 on each secondary profile connector 100.

[0023] What is further shown in Figs 1a and 1b is that the secondary profile connector 100 may comprise a base portion 112 configured to be connected to/form a part of the web 302 of the secondary profile 300. In case the secondary profile connector 100 is configured to be connected to the web 302 of the secondary profile 300, the connector 100 may further comprise fastening members 114a, 114b, shown here as circular openings, into which a suitable fastener such as a rivet can be received for attaching the connector 100 to the web 302 of the secondary profile 300. Other means for attaching the secondary profile connector 100 to the secondary profile 300 are also envisioned, for instance, the secondary profile connector 100 may be welded or screwed to the secondary profile 300.

[0024] The secondary profile connector 100 may further comprise a tongue arrangement base portion 116 which is arranged in a plane parallel to the base portion 112. The tongue arrangement base portion 116 may be laterally offset from the base portion 112. The tongue arrangement base portion 116 forms the portion from which the tab portion 104 extends, and it being laterally offset in relation to the base portion 112 facilitates longitudinal joining of two secondary profile 300 into lateral portions of the same opening 204 in the primary profile 200 while keeping the two longitudinally arranged secondary profiles 300 laterally/horizontally and vertically aligned with one another. The tongue arrangement base portion 116 preferably extends in a plane parallel to the insertion direction I of the secondary profile connector 100.

[0025] The secondary profile connector 100 may further comprise a longitudinal locking tongue 106. The longitudinal locking tongue 106 preferably also extends from the tongue arrangement base portion 116 and forms a part of the tongue arrangement 102. The longitudinal locking tongue 106 is configured to be elastically deformed during insertion of the secondary profile connector 100 into the opening 204 in the primary profile 200, and to elastically return to its original position once fully inserted and thus form a longitudinal lock against the side of the web 202 opposite the insertion side of the web 202. The longitudinal locking tongue 106 thus prevents unintentional release of the secondary profile connector 100 from the primary profile 200. The longitudinal locking tongue 106 has an L-shape when observed from the side, such that a vertical edge of the longitudinal locking tongue 106 which faces the side of the web 202 opposite the insertion side of the web 202 cooperates with said side

of the web 202 to form the longitudinal lock.

[0026] The longitudinal locking tongue 106 may further be pressed in order to elastically deform the longitudinal locking tongue 106 in the lateral direction to release the secondary profile connector 100 from the primary profile 200, such that it can be withdrawn through the opening 204.

[0027] The secondary profile connector 100 may further comprise an alignment tongue 108. The alignment tongue 108 extends from the tongue arrangement base portion 116 and forms a part of the tongue arrangement 102. The alignment tongue 108 is configured to bias the secondary profile connector 100 into the preferred position in relation to the primary profile 200, preferably such that the web 302 of the secondary profile 300 is vertically arranged. This is achieved as the alignment tongue 108 cooperates with the opening 204 in the web 202 of the primary profile 200 upon insertion of the secondary profile 300 and biases the secondary profile connector 100 into the desired position/orientation. The alignment tongue 108 preferably comprises an upper portion which comprises a lateral bend such that it protrudes laterally such that it may resiliently cooperate with the opening 204 when the secondary profile connector 100 is in its connected state with the primary profile 200. The upper portion preferably further comprises a distal laterally inclined portion which facilitates insertion of the alignment tongue 108 into the opening 204, the inclined portion during insertion being pressed against the side of the opening 204 such that a resilient force from the lateral bend on the upper portion pushes the secondary profile connector 100 into its desired position.

[0028] In one embodiment, the alignment tongue 108 is configured to cooperate with the alignment tongue 108 of a longitudinally adjoining secondary profile connector 100 arranged in the same opening 204. The alignment tongues 108 will then press against each other such that the respective secondary profile connector will be biased into the correct orientation in relation to the primary profile 200.

[0029] Preferably, the alignment tongue 108 is arranged at a lower portion of the tongue arrangement 102 while the longitudinal locking tongue 106 is arranged above the alignment tongue 108.

[0030] The tab portion 104 may, as shown in Figs 1a and 1b, be defined by a slit 110 extending in a longitudinal direction of the secondary profile connector 100. The slit 110 facilitates that the tab portion 104 can be deformed without significantly affecting the shape of the secondary profile connector 100 as a whole. It further defines a maximum second insertion depth D2 of the secondary profile connector 100. The longitudinal locking of the secondary profile connector 100 to the primary profile 200 will thus remain even if the tab portion 104 is deformed, as this deformation does not affect the remaining secondary profile connector 100.

[0031] The tab portion 104 in figs 1a and 1b is shown having a shape being essentially planar and arranged at

an angle in relation to the tongue arrangement base portion 116. A distal end section 104a of the tab portion 104 will thus be arranged in a position that does not coincide with a plane defined by the extension of the tongue arrangement base portion 116 from which the tab portion 104 extends. This means that a force exerted onto the distal end section 104a by the web 202 of the primary profile 200 will give rise to a bending moment which causes the tab portion 104 to deform in a predictable manner when the force exceeds the threshold value. The tongue arrangement base portion 116 is arranged parallel to the web 302 of the secondary profile 300 to which the secondary profile connector 100 is connected, but preferably laterally offset in the same direction in which the end section 104a of the tab portion 104 is laterally offset from the tongue arrangement base portion 116, which means that a force from thermal expansion of the secondary profile 300 will be essentially parallel with the plane defined by the extension of the tongue arrangement base portion 116. This, together with the preferably perpendicular arrangement between the primary profile 200 and the secondary profile 300, will ensure that the tab portion 104 deforms in a reliable and desirable manner.

[0032] Turning now to figs 2a and 2b, which show another embodiment of the secondary profile connector 100. As many features of the embodiments in figs 2a - 4b are shared with the embodiment shown in figs 1a-1b, reference is made to the description of the latter for these common features. Emphasis below will be made on the features unique to each embodiment.

[0033] The secondary profile connector 100 shown in figs 2a and 2b comprises tab portion 104 having an extension comprising a curved section, such that a distal end section 104a of the tab portion 104 is arranged in a position that does not coincide with a plane defined by the extension of the tongue arrangement base portion 116. The tab portion 104 comprises a distal end section 104a that is configured to face the web 202 of the primary profile 200 to which the secondary profile connector 100 is connected. The end section 104a facing the web 202 of the primary profile 200 could be beneficial as the end section 104a will thus slide against the web 202 as the tab portion 104 is deformed, providing a reliable and predictable deformation. The tab portion 104 shown in figs 2a and 2b is applicable to all embodiments disclosed herein.

[0034] In figs 3a and 3b is a further embodiment of the secondary profile connector 100 shown, which essentially corresponds to the secondary profile connector shown in figs 1a and 1b with the exception of the alignment tongue 108. In the embodiment of figs 3a and 3b, the alignment tongue 108 is divided into an upper and a lower portion by a longitudinal slit 120. Each portion of the alignment tongue 108 can more freely be formed to achieve a desired shape without having to consider that the two must be connected. Further, an elastic deformation of the upper portion of the alignment tongue 108 will not affect the lower portion, which is beneficial in certain cir-

cumstances. As is shown in Fig. 3a, the upper portion of the alignment tongue 108 comprises a lateral bend which is intended to provide a resilient force while the lower portion is essentially straight providing a pivot point and counter-element about which the resilient force from the upper portion acts. The alignment tongue 108 shown in figs 3a and 3b is compatible with all of the embodiments disclosed herein.

[0035] Figs 4a and 4b show a further embodiment of the secondary profile connector 100. The secondary profile connector 100 tongue arrangement 102 comprises a tongue 117 configured for resilient lateral displacement in response to being subjected to a lateral force. The tongue 117 is shown being intermediately arranged between the longitudinal locking tongue 106 and the alignment tongue 108, but it could be arranged in other positions on the tongue arrangement 102 as well. The tongue 117 may as shown be delimited vertically by an upper slit 122 and a lower slit 124, which allows the tongue 117 to laterally deflect without affecting the remaining tongue arrangement 102. The tongue 117 comprises a hook member 118, which in the connected state of the secondary profile connector 100 is configured for hooked engagement with a corresponding hook member 118 of secondary profile connector 100 inserted into the opening 204 from the opposite side of the web 202.

[0036] Once in a connected state, the hook member 118 of the respective secondary profile connector 100 will prevent unintentional release of the two secondary profiles 300 from each other since the interlocking arrangement of the tongues 117 will cause the hooking members 118 to engage each other if the secondary profiles 300 are pulled apart. In order for the hook member 118 to achieve its connected or locking position, the tongue 117 must as mentioned be resiliently laterally deflected/displaced. The lateral inclination of the hook member 118 will cause the tongue 117 to deflect upon connection of two secondary profiles 300, as it will come into contact with the hook member 118 of a meeting secondary profile connector 100 during insertion/connection. In one embodiment, the hook member 118 has an extension in the longitudinal direction of the secondary profile 300 (or in the longitudinal direction of the secondary profile connector 100) being such that the respective hook member 118 on two adjoining secondary profiles 300 does not obstruct lateral movement of the tongue 117 when the secondary profile connectors 100 are in their connected state (i.e. when the secondary profile connector 100 is inserted to the first insertion depth D1). This facilitates connection and releasing of the secondary profiles 300 to/from each other. Release of the tongue 117 could be further facilitated by providing a laterally bent distal end portion to the tongue 117, which deflects away from the adjoining secondary profile connector 100 such that the tongue 117 may be pressed in order to release the connection.

[0037] The tongue 117 provides longitudinal locking in addition or as an alternative to the longitudinal locking

tongue 106 which locks each secondary profile 300 to the primary profile 200, the tongue 117 allows locking of two adjacent secondary profiles 300 to each other. The tongue 117 and the hook member 118 thus contributes to the overall safety and structural integrity of the ceiling system.

[0038] Figs 5a, 5b and Fig. 6 shows different views of how two secondary profile connectors 100 are connected to each other by means of the hook member 118 on the tongue 117. The hook members 118 on the respective secondary profile connector 100 are in the connected state mutually arranged such that they will engage with each other if the secondary profile connectors 100 are withdrawn without firstly laterally bending the tongue 117. The secondary profiles 300 of the suspended ceiling system 1000 shown in Fig. 5a are thus longitudinally locked to the web 202 of the primary profile 200 and to each other, improving the overall safety of the system 1000. Each hook member 118 extends with a lateral inclination outwards from the tongue 117 of the secondary profile connector 100 towards the adjacent secondary profile connector 100. The tongue 116 is applicable to all embodiments disclosed herein.

[0039] In figs 7 and 8 is a suspended ceiling system 1000 shown, in a side and perspective view respectively. In Fig. 7, two secondary profile connectors 100 are shown with the secondary profiles omitted for clarity. As can be seen, the secondary profile connectors 100 are inserted to the first insertion depth D1 into the opening 204 in the web 202 of the primary profile 200. The tab portion 104 and the longitudinal locking tongue 106 defines the longitudinal position of the secondary profile 200 by their interaction with opposite sides of the web 202. Under normal use, the longitudinal gap between the longitudinal locking tongue 106 and the tab portion 104 should preferably be approximately equal to the thickness of the web 202 or just slightly bigger.

[0040] The secondary profile connectors 100 may be released from the primary profile 200 by pressing the longitudinal locking tongue 106 to cause a lateral displacement until it can be withdrawn through the opening 204. In case of a longitudinal elongation of the secondary profile 300, for instance due to being subjected to heat, the tab portion 104 will bend or deform such that the secondary profile 300 can be inserted to the second insertion depth D2 or any position therebetween. It is to be realized that while the second insertion depth D2 is illustrated in Fig. 7 as the maximum insertion length of the secondary profile connector 100, which is defined by the length of the slit 110, the second insertion depth D2 does not necessarily have to be maximum insertion depth. Depending on the material and the length of the secondary profile 300, the second insertion depth D2 could be such that the tab portion 104 only elastically deforms during the longitudinal expansion of the secondary profile 300. When the cause of the longitudinal expansion is removed and the secondary profile 300 returns to its intended length, the tab portion 104 will by its resilience orient the

secondary profile 300 in the desired position in relation to the primary profile 200.

[0041] In Fig. 8, a suspended ceiling system is shown which comprises one secondary profile 300 connected to the primary profile 200. The secondary profile 300 may comprise fastening members 304a, 304b, preferably in the shape of holes through which suitable fasteners can be arranged to fasten the secondary profile connector 100 to the secondary profile 300. The fastening members 304a, 304b on the secondary profile 300 are alignable with the fastening members 114a, 114b on the secondary profile connector 100.

[0042] The secondary profile 300 in the embodiment shown in Fig. 8 further comprises a horizontal bottom flange 306. The bottom flange 306 provides lateral strength and stability to the secondary profile 300 and it may further be configured to cooperate with a horizontal bottom flange on the primary profile 200, as shown in Fig. 5, to facilitate arrangement of the secondary profile 300 in the desired orientation in relation to the primary profile 200.

[0043] Turning to Fig. 9 which shows a further embodiment of a secondary profile connector 100 which is formed integrally with the secondary profile 300. The secondary profile connector 100 shown in Fig. 9 corresponds to the embodiment shown in Fig. 3a and 3b, but it is to be realized that any embodiment of the secondary profile connector 100 disclosed herein could be formed integrally with the secondary profile 300.

[0044] A secondary profile connector formed separately from the secondary profile may offer advantages such as freedom of choosing material and material thickness while a secondary profile connector formed integral with secondary profile may provide benefits in terms of manufacturing as it requires no assembly. The secondary profile connector 100 could be formed by stamping and/or punching directly on the material of the secondary profile 300.

[0045] Fig. 10 shows yet another embodiment of the secondary profile connector 100. The tab portion 104 shown in the embodiment of Fig. 10 has an extension with a continuous bend forming an arc when observed from above. The bend is preferably such that the distal end section 104a of the tab portion 104 is not parallel to the web 202 of the primary profile 200. When a force above the threshold value is applied in the insertion direction I of the secondary profile connector 100, the tab portion 104 will bend in a predictable and reliable manner by being pressed against the web 202 of the primary profile 200.

[0046] In Fig. 11, a further embodiment of the secondary profile connector 100 is shown where the tab portion 104 comprises a shape that is essentially V-shaped when observed from above. Other shapes are also possible such as for instance a U-shape. In the embodiment shown in Fig. 11, the distal end section 104a is arranged in the plane of the tongue arrangement base portion 116 which may in some applications be beneficial. For in-

stance, by having the distal end section 104a in the plane tongue arrangement base portion 116 from which the tab portion 104 extends, a reduction is achieved in the bending moment generated when the tab portion 104 is pushed against the web 202 of the primary profile 200. This reduces the risk of any eventual bending from occurring in the secondary profile connector 100 by the momentum force generated from the tab portion 104 pushing against the primary profile 200, which in the worst case scenario could cause a release of the secondary profile connector 100.

[0047] In other embodiments, such a situation can be avoided by providing a tab portion 104 which deforms sufficiently easily such that it does not affect the shape of the secondary profile connector 100.

[0048] It will be appreciated that the present invention is not limited to the embodiments shown. Several modifications and variations are thus conceivable within the scope of the invention which thus is exclusively defined by the appended claims.

Claims

1. A secondary profile connector (100) for a suspended ceiling system (1000) comprising a secondary profile (300) associated with the secondary profile connector (100) and a primary profile (200) having a web (202) provided with an opening (204) for reception of the secondary profile connector (100), the secondary profile connector (100) comprising a tongue arrangement (102) insertable into the opening (204) of the web (202) of the primary profile (200) for releasable connection of the secondary profile connector (100) to the primary profile (200), the tongue arrangement (102) comprising a tab portion (104) which, in a connected state of the secondary profile connector (102), is configured to abut an insertion side of the web (202) for defining a first insertion depth (D1) for the secondary profile connector (100), wherein the tab portion (104) is configured to be deformed in response to being pressed against the insertion side of the web (202) with a force exceeding a threshold value for defining a second insertion depth (D2) while maintaining engagement with the insertion side of the web (202), the second insertion depth (D2) being greater than the first insertion depth (D1).
2. The secondary profile connector (100) according to claim 1, wherein the tab portion (104) is defined by a slit (110) extending in a longitudinal direction of the secondary profile connector (100).
3. The secondary profile connector (100) according to claim 2, wherein the tab portion (104) comprises a distal end section (104a) which is configured to abut

against the web (202) in a position that does not coincide with a plane that is defined by the extension of a tongue arrangement base portion (116) from which the tab portion (104) extends.

5

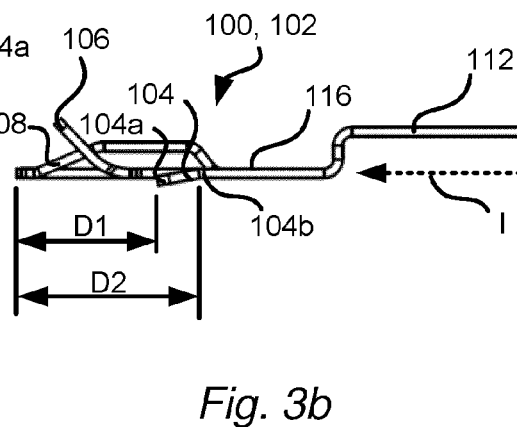
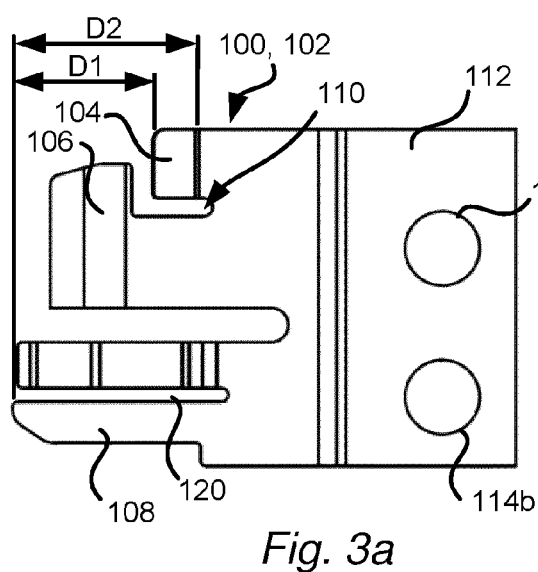
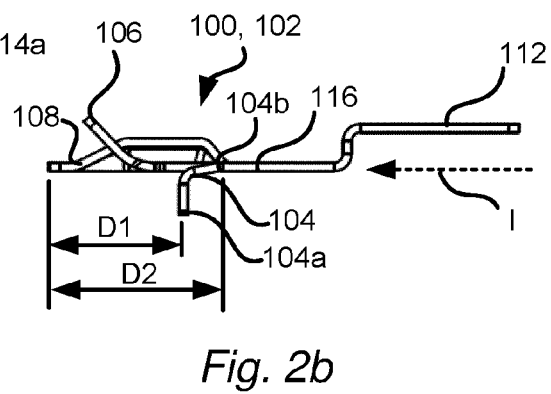
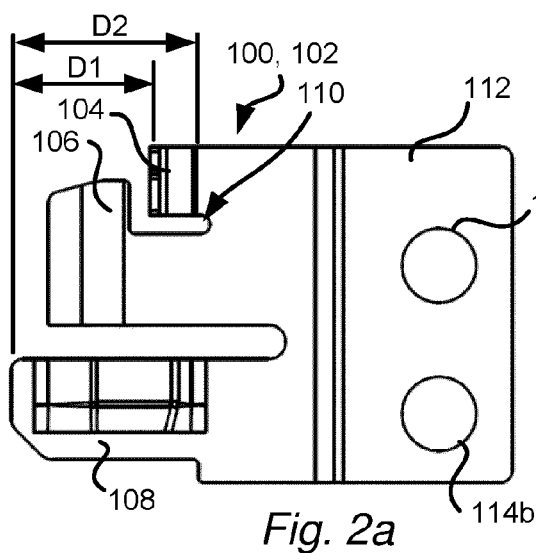
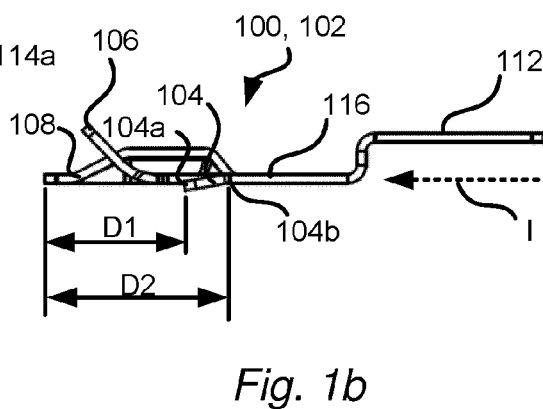
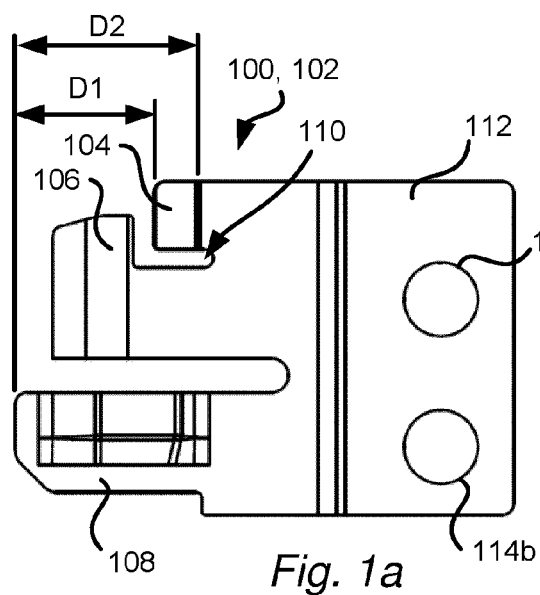
4. The secondary profile connector (100) according to claim 2, wherein the tab portion (104) comprises a distal end section (104a) which is configured to abut against the web (202) in a position that coincides with a plane that is defined by the extension of a tongue arrangement base portion (116) from which the tab portion (104) extends. 10
5. The secondary profile connector (100) according to any one of the preceding claims, in which the tongue arrangement (102) comprises a tongue (117) configured for resilient lateral displacement in response to being subjected to a lateral force and comprising a hook member (118), wherein the hook member (118), in the connected state of the secondary profile connector (100), is configured for a hooked engagement with a corresponding hook member (118) of a secondary profile connector (100) inserted into the opening from the opposite side of the web (202). 15
20
25
6. A suspended ceiling system (1000) comprising a secondary profile connector according to any one of claims 1-5, a secondary profile (300) associated with the secondary profile connector (100) and a primary profile (200) having a web (202) provided with an opening (204), 30
wherein the secondary profile (300) is releasable connectable to the primary profile (200) by insertion of the secondary profile connector (100) associated with the secondary profile (300) into the opening (204) in the web (202). 35

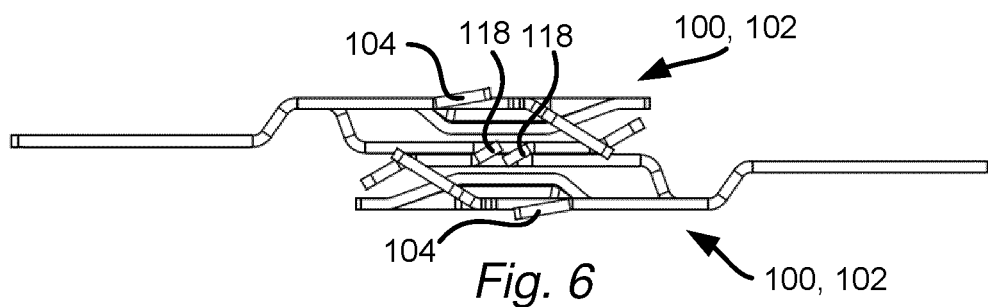
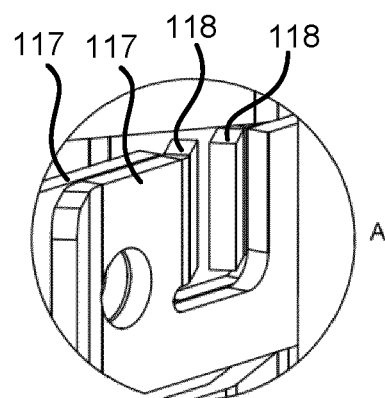
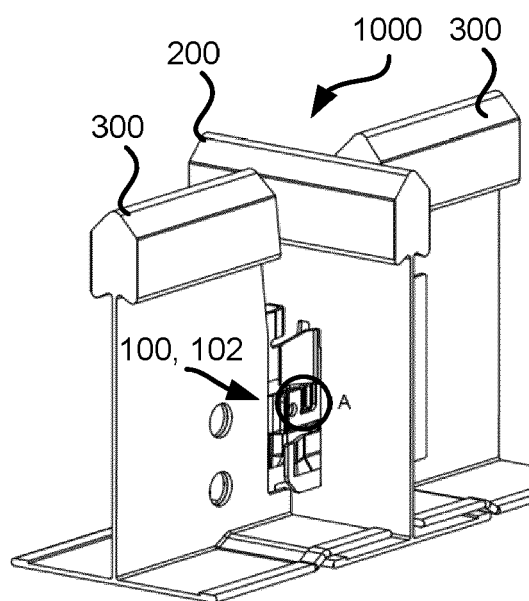
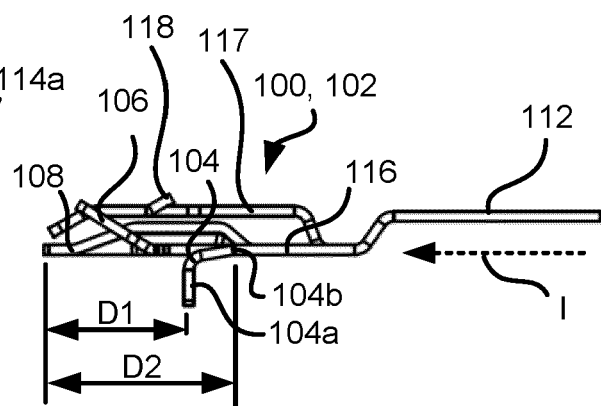
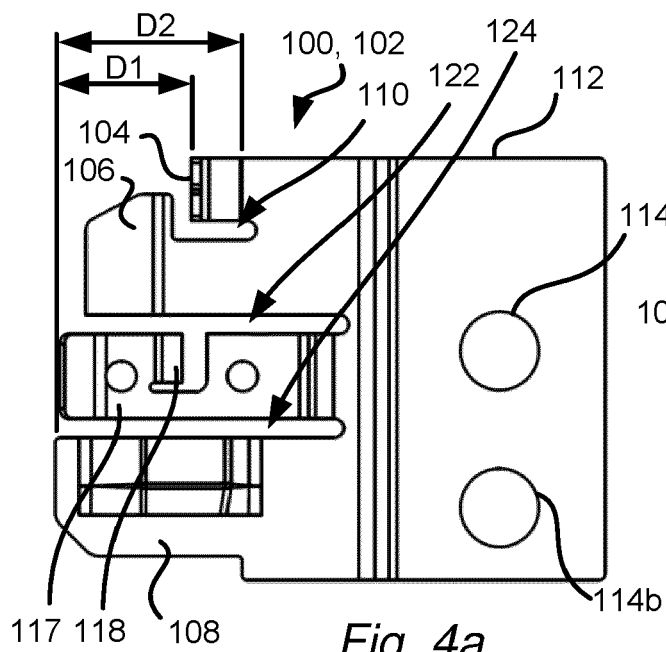
40

45

50

55





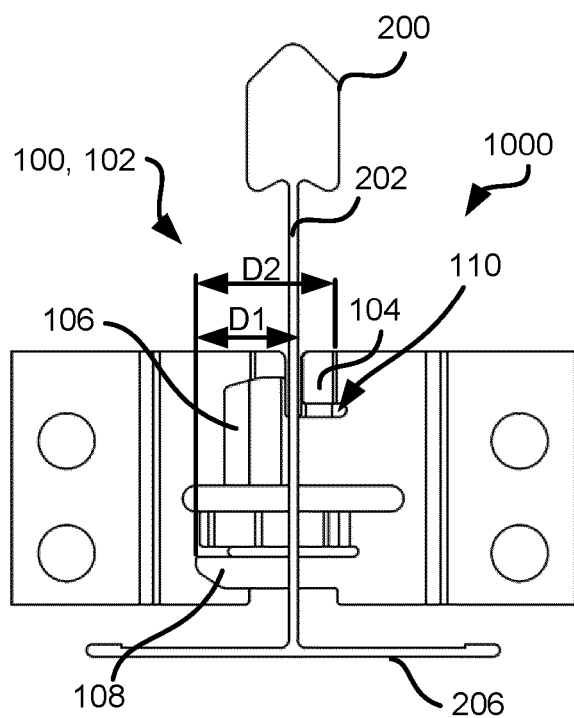


Fig. 7

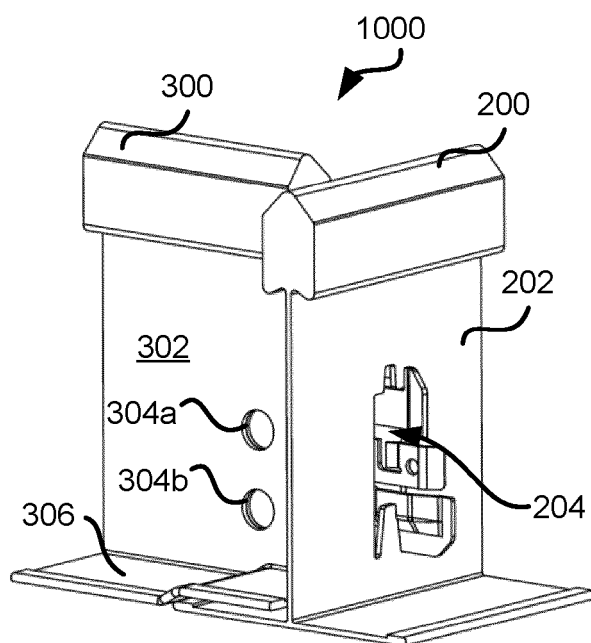


Fig. 8

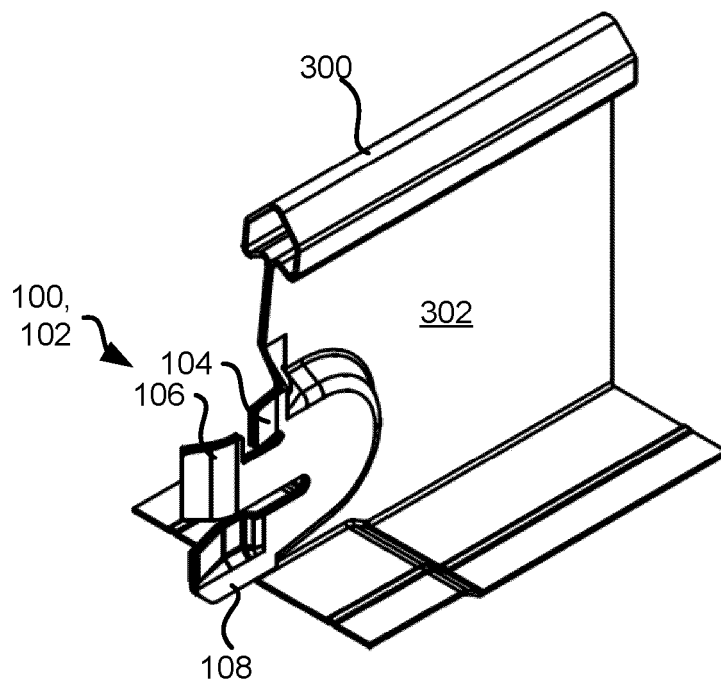
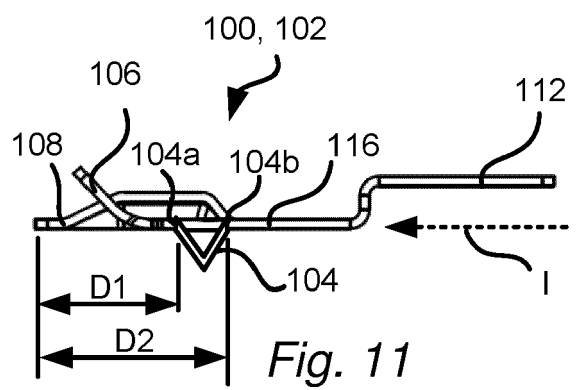
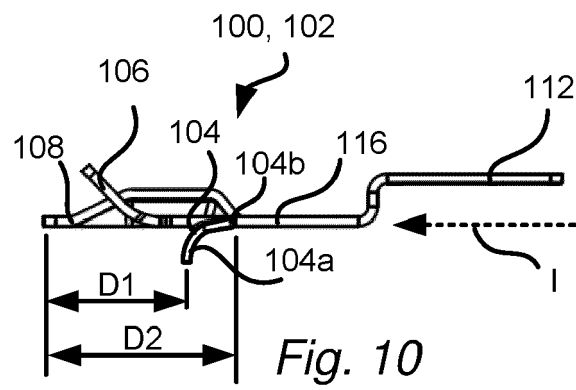


Fig. 9





EUROPEAN SEARCH REPORT

Application Number
EP 20 15 5420

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 703 034 A1 (CHICAGO METALLIC CONTINENTAL [BE]) 20 September 2006 (2006-09-20) * paragraph [0029] - paragraph [0050]; figures 1a-2a *	1-6	INV. E04B9/12
X	US 3 189 139 A (HENRY ZNAMIROWSKI ET AL) 15 June 1965 (1965-06-15) * column 7, line 6 - column 8, line 18; figures 7-10 *	1,2,4-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 July 2020	Examiner Melhem, Charbel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 15 5420

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-07-2020

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1703034 A1	20-09-2006	AT 472642 T	15-07-2010
		EP 1703034 A1	20-09-2006
		ES 2348160 T3	30-11-2010
		PL 1703034 T3	31-12-2010

US 3189139 A	15-06-1965	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82