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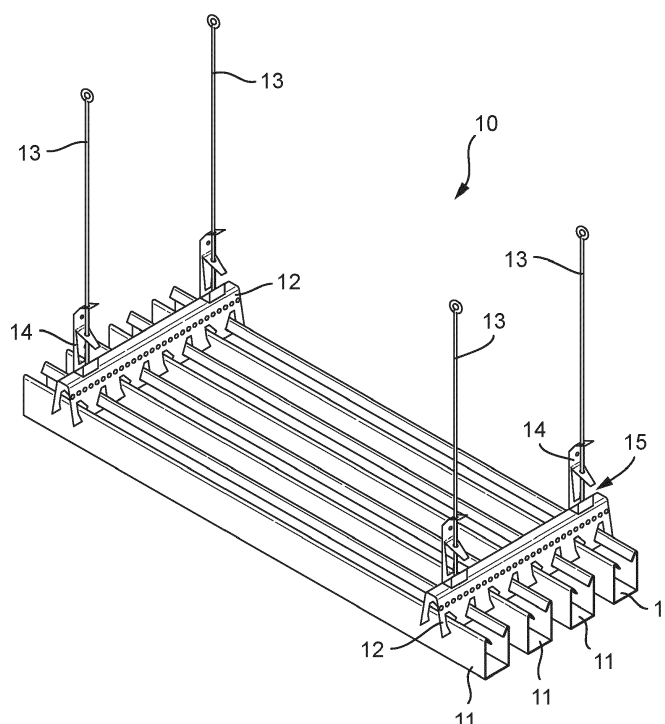
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(54) CEILING SYSTEM

(57) There is provided a ceiling system comprising: first and second elongate carriers configured to be suspended from an overhead structure; a ceiling panel having an elongate shape, the ceiling panel extending between the first and second elongate carriers and coupled to the first and second elongate carriers; and a stiffening beam extending between the first and second elongate

carriers and connected to the first and second elongate carriers independently from the coupling of the ceiling panel to the elongate carriers; wherein the shape of the ceiling panel defines an elongate cavity inside the ceiling panel; and the stiffening beam is positioned within the cavity inside the ceiling panel.

Fig. 1



Description

[0001] The following disclosure relates to a ceiling system, in particular suspended ceiling system.

[0002] A variety of ceiling systems are known, in which ceiling panels are supported by carriers. It is desirable for such systems to be designed with consideration for the ease of installation whilst ensuring a good quality finish for the ceiling system once installed.

[0003] A ceiling system is known, for example as disclosed in EP 3 591 131, in which a beam is connected to carriers by connecting brackets, in order to give stiffness to the ceiling system, which may otherwise shift or move during use. In the known ceiling system, the beam is provided above both the ceiling panels and the carriers.

[0004] It may be desirable to provide a ceiling system in which a stiffening feature (such as a beam) is easy to install without affecting the aesthetic effect of the ceiling.

[0005] According to the invention, there are provided a ceiling system and a method of installing a ceiling system, as defined in the appended claims.

[0006] Embodiments will be more clearly understood from the following description, given by way of example only, with reference to the accompanying drawings, in which:

Fig 1 illustrates a ceiling system;

Fig 2 illustrates a part of the ceiling system shown in Fig 1, showing the location of a stiffening beam;

Fig 3 illustrates an example connection between a stiffening beam and an elongate carrier;

Fig 4 shows a perspective view of the connection illustrated in Fig 3;

Fig 5 shows an alternative perspective view of the connection illustrated in Fig 3.

[0007] Fig 1 illustrates an example of a ceiling system 10. The ceiling system 10 includes one or more ceiling panels 11 which are supported by other elements of the ceiling system 10. The ceiling panels 11 in this shown embodiment have a lower surface that primarily forms the surface visible to occupants of the space below. The ceiling panels 11 are supported by at least first and second elongate carriers 12. Thus, at least one ceiling panel may be supported by at least first and second carriers.

[0008] The elongate carriers 12 may fix the position of adjacent ceiling panels 11 relative to each other. As shown, each elongate carrier 12 may support a plurality of ceiling panels 11. It should be appreciated that the number of ceiling panels 11 supported by each elongate carrier 12, and therefore the required length of the elongate carrier 12, will depend upon the size of the area to be covered by the ceiling system 10. In general, however, supporting the ceiling panels 11 by the elongate carriers 12 rather than supporting each ceiling panel 11 independently can reduce the number of connections to be made to a structure from which the ceiling system is suspended.

[0009] Each of the ceiling panels 11 may be supported by two or more elongate carriers 12 spaced apart along the length of the ceiling panels 11. It should be appreciated that the number of the elongate carriers 12 required to support the ceiling panels 11 may depend upon several factors, such as the length of ceiling panels 11 required to provide the area to be covered by the ceiling system 10 and the strength of the material chosen to form the ceiling panels 11.

[0010] In some arrangements, the ceiling panels 11 are coupled to the elongate carriers 12 by a push-fit connection. Thus, the elongate carriers may be configured such that the at least one ceiling panel can be coupled to the elongate carriers by a push-fit connection. Such an arrangement may facilitate installation of the ceiling panels 11 to the carriers 12 because no tools may be necessary in order to complete the connection. This can be advantageous given that the installation of the ceiling system may involve working at height.

[0011] It should be understood that by push-fit connection, it is meant any connection that may enable two components to be coupled by a user merely pushing one component into contact with another. Such a connection may avoid the requirement for separate fixings, such as nuts and bolts or other separate couplings, and/or may avoid the requirement for tools.

[0012] An example of push-fit connections may include a snap-fit connection, in which one component may have one or more protrusions or features that engage with corresponding recesses, which may include grooves or dimples, or features on the other component. In such a connection, during the process of coupling the two components together, at least one of the components may resiliently deform, usually temporarily, to enable the engagement of the protrusions with the corresponding recesses.

[0013] A further example of a push-fit connection may include a friction-fit connection, in which part or all of one component may engage with a recess or protrusion or other cooperating feature within another component and/or between two parts of another component and be secured to it by the friction at the surfaces of the components that are in contact. It should be appreciated that other forms of push-fit connection may also be used.

[0014] It should be appreciated, however, that other known arrangements for coupling ceiling panels to carriers, including those requiring separate fixings such as nuts and bolts and/or those requiring tools, may be used.

[0015] Each of the elongate carriers 12 may be supported by a plurality of suspension hangers 13. The suspension hangers 13 may be directly or indirectly connected at one end to the elongate carriers 12. The suspension hangers 13 may be connected at their opposite end to a suitable location within the structure in which the ceiling system 10 is to be installed. For example, the suspension hangers 13 may be connected to a ceiling in a building and/or structural beams within a building.

[0016] The suspension hangers 13 are connected to

the elongate carriers 12 at suspension locations 14 provided on the elongate carriers 12. It should be appreciated that the choice of locations of the suspension locations 14 may be determined based on the required stability of the ceiling system 10 overall and/or to facilitate the installation of the ceiling system 10, for example during an initial step to install the elongate carriers 12 before other components are added to the ceiling system 10. It should also be appreciated that the number of suspension hangers 13 required to support the ceiling system 10 depends on several factors, such as the size of the area to be covered by the ceiling system 10 and/or the weight of the ceiling system 10.

[0017] As shown in Fig 2, in an arrangement according to the present disclosure, a stiffening beam 15 is connected between at least two elongate carriers 12. For example, a stiffening beam 15 may be provided between adjacent elongate carriers 12 that are arranged side by side. The adjacent elongate carriers 12 may be arranged such that their elongate directions are parallel to each other. However, this is not essential and the elongate direction of one elongate carrier 12 may be at an oblique angle to the elongate direction of an adjacent elongate carrier. It should be appreciated that, in some arrangements, a stiffening beam 15 may be connected to more than two elongate carriers 12. Similarly, more than one stiffening beam 15 may be connected between two elongate carriers 12.

[0018] In an arrangement, the one or more stiffening beams 15 may stabilize the relative positions of the elongate carriers 12 to which the one or more stiffening beams 15 are connected. In other words, the position of one elongate carrier 12 relative to the position of another elongate carrier 12 may be fixed. Such an arrangement may assist in providing a good quality finish for the completed ceiling system 10. For example, if an elongate carrier 12 moves relative to another elongate carrier 12, it may cause distortion of one or more ceiling panels 11 coupled to the two elongate carriers 12, for example as a result of one part of the ceiling panel 11 moving relative to another part of the ceiling panel 11. This in turn may result in an undesirable irregular appearance of the ceiling panels 11 when viewed from below.

[0019] The ceiling system 10 of the present disclosure may include ceiling panels 11 that are relatively flexible. Ceiling systems 10 using such relatively flexible ceiling panels 11 may be particularly susceptible to a problem of distortion of the ceiling panels 11 caused by relative movement of the elongate carriers 12 because the ceiling panels 11 may not have sufficient stiffness to stabilize the position of one elongate carrier 12 relative to another elongate carrier 12. For example, the ceiling system 10 may include ceiling panels 11 formed wholly or partially from a flexible fibre-based material, optionally felt. Alternatively or additionally, the ceiling panels 11 may be formed from materials that have a higher bulk stiffness but be formed from thin sections, resulting in the finished ceiling panels 12 being relatively flexible. For example

the ceiling panels 11 may be formed from thin sections of aluminium. Other materials may also be used.

[0020] In order to provide stiffness to the ceiling system 10, the stiffening beam 15 may be stiffer than at least one ceiling panel 11, and may be stiffer than all of the ceiling panels 11, where a plurality of ceiling panels 11 are provided. In this context, being stiffer means that the stiffening beam and/or its connection to the carriers may allow a smaller movement between the carriers for a given force exerted between the carriers than would be possible for carriers with a ceiling panel coupled between them. Thus, whilst the ceiling panel 11 may be made from a flexible material (such as a felt), the stiffening beam 15 may be made of a stiffer material, such as a metal or a non-fabric plastics material. For example, the stiffening beam may be made from aluminium or steel.

[0021] In order to provide stiffness to the ceiling system 10, the stiffening beam 15 may be rigidly connected to the first and second elongate carriers 12, between which the stiffening beam 15 extends. This means that the connection between the stiffening beam 15 and an elongate carrier 12 inhibits relative movement of the stiffening beam 15 and the elongate carrier 12 to which it is attached.

[0022] For example, the connection between the stiffening beam 15 and an elongate carrier 12 may be configured to prevent rotation between the stiffening beam 15 and the elongate carrier 12. It will be appreciated that such connections between a stiffening beam 15 and two elongate carriers 12 will prevent rotation of one elongate carrier 12 relative to the other elongate carrier 12.

[0023] Alternatively or additionally, the connection may be configured to prevent translational movement between the stiffening beam 15 and the elongate carrier 12. Again, provision of such connections between a stiffening beam 15 and two elongate carriers 12 prevents relative translational movement between the elongate carriers 12. In contrast, a ceiling panel 11 may be permitted to shift or slide slightly relative to the elongate carrier 12 to which it is coupled. A rigid connection between a stiffening beam 15 and an elongate carrier 12 may be provided in several different ways, which will be described further below.

[0024] In some arrangements, the stiffening beam 15 may be used to mount additional items to the ceiling system. For example, hardware such as lighting, speakers or other electrical equipment, and/or cables to connect to such electrical equipment may be mounted to, or suspended from, the stiffening beam 15. This may be beneficial in arrangements in which a ceiling panel is not strong enough to support such additional items.

[0025] In arrangements according to the present disclosure, each ceiling panel 11 has an elongate and/or linear shape. For example, the length of a ceiling panel 11 in its elongate direction may be at least four times, at least eight times, or at least ten times at least one of a width or

height of the ceiling panel 11. The elongate shape of the ceiling panel 11 defines an elongate cavity inside the ceiling panel 11. This allows for a stiffening beam 15, which also has an elongate shape, to be positioned within the cavity inside a ceiling panel 11. The stiffening beam 15 may have a length in its elongate direction which is at least four times, at least six times, or at least eight times at least one of its width or height.

[0026] By positioning the stiffening beam 15 inside the cavity, the stiffening beam 15 does not increase the overall height of the system. Accordingly the assembled height of the system may be just the combined height of the ceiling panel 11 and the elongate carrier 12. This may make the ceiling system suitable for use in situations in which the space available for the ceiling system is limited. It may also conceal the stiffening beam.

[0027] In an arrangement, all of the ceiling panels 11 in a ceiling system may have the same construction, even though one or more ceiling panels 11 may have a stiffening beam 15 within its cavity and one or more ceiling panels 11 may not have a stiffening beam 15 within its cavity. A stiffening beam 15 may be shorter than a ceiling panel 11 in which it is provided, reducing its visibility from the side of the ceiling system.

[0028] The ceiling panels 11 may have a range of different elongate shapes, provided that that shape includes an elongate cavity inside the ceiling panel 11 for accommodating a stiffening beam 15. In general, the ceiling panel has a three dimensional, rather than a completely flat shape, so as to accommodate a stiffening beam.

[0029] When a ceiling panel 11 is connected to the first and second elongate carriers 12, an upper side and a lower side of the ceiling panel 11 are defined. The lower side of the ceiling panel 11 is directed towards the room, or the space vertically below, when the ceiling system 10 is installed in a structure. The upper side of the ceiling panel 11 is directed vertically upwards, and may be the side closest to the elongate carriers 12, which are positioned above the ceiling panels 11.

[0030] As shown in FIGS. 1 and 2, the upper side of at least one of the ceiling panels 11, or all of the ceiling panels 11, may be open. This means that a ceiling panel 11 may be arranged over a stiffening beam 15, with the stiffening beam already connected to the first and second elongate carriers 12, by passing the open side of the ceiling panel 11 over the stiffening beam 15. This allows for the stiffening beam 15 to be connected to the first and second elongate carriers 12 before coupling the ceiling panel 11 which is to contain the stiffening beam 15 (or all of the ceiling panels) to the first and second elongate carriers 12.

[0031] The ceiling panels 11 may each have a lower face designed to face the room when the ceiling system 10 is installed. The stiffening beam 15 may be located on the opposite side of the lower face from the room. This conceals the stiffening beam from view, which may provide a more aesthetically pleasing arrangement. This

may also allow for installation of the ceiling system in an island configuration, in which the ceiling panels 11 do not extend wall-to-wall. Then, the stiffening beam 15 may be concealed from view, even when the system is viewed from the side.

[0032] As shown in FIGS. 1 and 2, the ceiling panel 11 may have a base comprising the lower face, and first and second side walls extending from respective edges of the base, such that the cavity is the space between the first and second side walls. The first and second side walls may extend along the entire length of the ceiling panel 11 in its elongate direction. The distal edge of each side wall, opposite to the edge of the side wall which is connected to the base, may be configured to be coupled to the first and second elongate carriers 12.

[0033] For example, the distal edges may be configured to engage with the first and second elongate carriers 12 by a push-fit connection, as discussed above. First and second side walls may also contribute to concealment of a stiffening beam 15 within the ceiling panel cavity (and the elongate carriers 12), when the ceiling system 10 is viewed from a viewpoint that is not directly below.

[0034] As shown in Figs 1 and 2, the ceiling system 10 may comprise a plurality of ceiling panels 11. When the ceiling system 10 comprises a plurality of ceiling panels 11 supported by the first and second elongate carriers 12, the plurality of ceiling panels 11 may have the same shape, may be made from the same material, and/or may be identical to one another. Alternatively, plural different forms of ceiling panel 11, for example differing by shape and/or material, may be combined in a ceiling system 10. As a further alternative, a single ceiling panel 11 may be supported by the first and second elongate carriers 12. For example, a single panel 11 having a width similar to the length of the elongate carriers 12 may be provided.

[0035] When a plurality of ceiling panels 11 is provided, at least one of the ceiling panels 11 may not include a stiffening beam 15 positioned within the cavity inside said ceiling panel 11. A stiffening beam 15 may be provided inside one of the ceiling panels 11 only. Alternatively, at least two of the ceiling panels 11 may have a respective stiffening beam 15 (one per ceiling panel) positioned within their respective cavities. This may further contribute to the stiffness of the overall ceiling system 10.

[0036] The connections between a stiffening beam 15 and the first and second elongate carriers 12 may be independent of the coupling between the first and second elongate carriers 12 and the ceiling panel 11 containing the stiffening beam 15. In other words, the stiffening beam 15 is not connected to the first and second elongate carriers 12 via being connected to the ceiling panel 11, and the ceiling panel 11 is not connected to the first and second elongate carriers 12 via being connected to the stiffening beam 15.

[0037] A ceiling panel 11 and a stiffening beam 15 contained within the ceiling panel 11 may be connected to one another only by virtue of their respective connec-

tions with the first and second elongate carriers 12, namely they may be indirectly connected. This enables the stiffening beam 15 to be connected to the first and second elongate carriers 12 in a separate step from coupling the ceiling panels 11 to the first and second elongate carriers 12. This may aid with installation of the system, and may allow ceiling panels 11 to be easily replaced, without requiring the connection between the stiffening beam and the elongate carriers to be unmade and re-made in order to replace a ceiling panel. The first and second elongate carriers 12 bear the weight of both the ceiling panels 11 and any stiffening beams provided 15. The ceiling panels 11 themselves may be unsuitable for bearing weight of other components due to the flexibility and low strength of the material from which they are formed.

[0038] The stiffening beam 15 may comprise a profile having a base with at least one side wall extending from an edge of the base. For example, the stiffening beam 15 may have an L-shaped cross-section, perpendicular to its elongate direction. The stiffening beam 15 may comprise a base with first and second side walls extending from respective edges of the base, so that the cross-section of the stiffening beam 15 is U-shaped. The base and one or more side walls contribute to the stiffness of the stiffening beam 15. The base and one or more side walls may also be used to make the connections between the stiffening beam 15 and the elongate carriers 12. It will be appreciated, however, that other forms of stiffening beam 15 may be used, with suitable modifications to the means of connecting the stiffening beam 15 to the elongate carriers 12. For example the stiffening beam could be a flat strip, a box section or have a curved and/or circular cross-section.

[0039] The stiffening beam 15 may be connected to at least one of the first and second elongate carriers by a bolted connection, for example as shown in Fig 2. In the arrangement of Fig 2, the elongate carrier 12 and the stiffening beam 15 each comprise a hole through which a bolt 30 is configured to pass. The bolt 30 may be secured by a nut 31 so as to secure the stiffening beam 15 and elongate carrier 12 together and fix their relative positions.

[0040] Each elongate carrier 12 may comprise a plurality of holes for accommodating bolts 30 for attachment to one or more stiffening beams 15. These holes may be spaced apart along the elongate direction of the elongate carrier 12 to provide multiple options for the position of the connection of the stiffening beam 15 to the elongate carrier 12. The holes may be positioned relative to the positions of features of the elongate carrier 12 configured to couple the ceiling panels 11 such that a desired relative position of the stiffening beam 15 and ceiling panel 11 can be provided. For example, the location of each hole may be configured so that when a stiffening beam 15 is connected to the elongate carrier 12 by a bolted connection, a ceiling panel 11 may be arranged over the stiffening beam 15. In the case of a ceiling panel 11 having first and

second side walls, the distal edge of which are coupled to the elongate carrier as disclosed above, each hole may be located between a pair of elements on the elongate carrier that are configured to couple to a respective one of the first and second side walls of a ceiling panel 11.

[0041] A plurality of holes as explained above also in this way allows for more than the stiffening beam 15 to be connected to the elongate carrier 12. The plurality of holes in the elongate carrier 12 may also be used as connection points 14 for suspending the elongate carriers 12 from an overhead structure, as described above. In an arrangement, a different set of one or more holes may be used to connect an elongate carrier 12 to a stiffening beam 15 from a set of one or more holes used for suspending the elongate carriers.

[0042] The stiffening beam 15 may also include a plurality of holes arranged at intervals along its elongate direction. The holes may be provided in the base of the stiffening beam 15. A plurality of holes in the stiffening beam 15 allows the stiffening beam to be connected to both first and second elongate carriers by respective bolted connections. It may also allow for the stiffening beam 15 to be connected to three or more elongate carriers 12. It may also allow the distances between the first and second (and optionally additional) elongate carriers 12 to be adjusted according to requirements of the specific system being installed.

[0043] Alternative or additionally, the stiffening beam 15 may be connected to at least one of the first and second elongate carriers 12 by a push-fit connection. What is meant by "push-fit connection" is explained above. In some arrangements of a ceiling system, some connections between a stiffening beam 15 and an elongate carrier may be formed by a bolted connection and some connections may be formed by a push-fit connection.

[0044] The use of a bolted connection between the stiffening beam 15 and an elongate carrier 12 may be desirable in some configurations because it may facilitate provision of a rigid connection between them. In some configurations the use of a push-fit connection between a stiffening beam 15 and elongate carrier 12 may be preferred for ease of installation and/or because it avoids the need for tools.

[0045] In an arrangement, a stiffening beam 15 may be connected to an elongate carrier 12 directly. Alternatively, a coupling member may be provided between the stiffening beam 15 and the elongate carrier 12, with the coupling member connected to each of the stiffening beam 15 and the elongate carrier 12.

[0046] In an arrangement in which stiffening beam 15 and elongate carrier 12 directly connect to one another using a push fit connection, the elongate carrier 12 may be shaped so as to receive a base of stiffening beam. One of the stiffening beam 15 and the elongate carrier 12 may include protrusions, with the other including recesses, which are configured to engage with one another by a push-fit or snap-fit connection.

[0047] As described above, the stiffening beam 15 may be rigidly connected to the elongate carriers 12, meaning that relative movement between the stiffening beam 15 and each elongate carrier is prevented by the manner of connection. This means that the relative positions of the stiffening beam 15 and an elongate carrier 12 are fixed (they may not translate relative to one another) and the relative orientations of the stiffening beam 15 and an elongate carrier 12 are fixed (they may not rotate relative to one another).

[0048] In an arrangement, a coupling member may be provided that facilitates connecting the stiffening beam 15 and an elongate carrier 12 together in such a way as to fix their relative orientations. For example, a coupling member may fix the relative orientations of the stiffening beam 15 and an elongate carrier 12 such that the elongate direction of the stiffening beam is perpendicular to the elongate direction of the elongate carrier 12, with the elongate direction of the stiffening beam 15 spanning the distance between adjacent elongate carriers 12. It will be appreciated that the stiffening beam 15 could be arranged at different angles relative to the elongate carriers 12, and a perpendicular arrangement is not required.

[0049] Figs 3 to 5 show an example of a coupling member 20. The coupling member 20 is configured to fix the relative orientations of the stiffening beam 15 and an elongate carrier 12 by its engagement with each of the stiffening beam 15 and the elongate carrier 12.

[0050] For example, as shown in Fig 5, the elongate carrier 12 may comprise a base with side walls extending from respective edges of the base (downwards when the carrier is suspended from a ceiling). The coupling member 20 may be configured to fit between the side walls of the elongate carrier 12, with a tight fit, so as to be pressed by both respective pairs of side walls. This tight fit prevents any rotation of the coupling member 20 relative to the elongate carrier 12, about a vertical axis (when the ceiling system is installed). Similarly, the coupling member 20 may be configured to fit between side walls of the stiffening beam 15, so as to be pressed by those side walls, thereby preventing relative rotation between the stiffening beam 15 and the coupling member 20 about the vertical axis. The coupling member 20 itself may be a rigid component. In this way, the coupling member 20 may reliably fix the relative orientations of the stiffening beam 15 and an elongate carrier 12 such that there is little to no play or clearance between these components.

[0051] The coupling member 20 itself may comprise a base with arms extending from respective edges of the base, as shown in Fig 5. The base and arms of the coupling member 20 may be configured to fit between the side walls of the elongate carrier 12, with the base of the coupling member 20 contacting the base of the elongate carrier 12, and the arms contacting the side walls of the elongate carrier 12, and then extending between the side walls of the stiffening beam 15.

[0052] As shown in Figures 3 to 5, the coupling member 20 may be used in conjunction with a bolted connection

between stiffening beam 15 and an elongate carrier 12. The coupling member 20 may be situated between the stiffening beam 15 and elongate carrier 12, with the bolt 30 passing through the elongate carrier 12, coupling member 20, and stiffening beam 15. The bolt 30 may be secured with a nut 31.

[0053] A coupling member providing rigidity to the connection between the stiffening beam 15 and the elongate carrier 12 may alternatively be used within a push-fit connection, for example in which each of the stiffening beam 15 and elongate carrier 12 are push-fit connected to the coupling member. Alternatively, the stiffening beam 15 and elongate carrier 12 may be push-fit connected to each other with the coupling member between them in order to increase the rigidity of the connection.

[0054] As well as fixing the relative orientations of the stiffening beam 15 and an elongate carrier 12 (i.e. preventing relative rotation), a coupling member 20 may also fix, or assist in fixing, the relative positions of the stiffening beam 15 and an elongate carrier 12 (i.e. preventing relative translation). For example, the coupling member 20 may include features configured to engage with corresponding features on one or both of the elongate carrier 12 and stiffening beam 15. These features could be protrusions, recesses, grooves, dimples, or any other structural feature capable of preventing relative translation between components.

[0055] Any of the arrangements for connecting a stiffening beam 15 to an elongate carrier 12, as described herein, may be used to connect the stiffening beam 15 to each of the first and second elongate carriers 12, respectively.

[0056] The ceiling system according to the present disclosure may be assembled by providing first and second elongate carriers 12 as described above, connecting a stiffening beam 15 to the first and second elongate carriers 12, and subsequently connecting a ceiling panel 11 to the first and second elongate carriers 12, such that the stiffening beam 15 is positioned within the cavity inside the ceiling panel 11. When the ceiling system 10 comprises a plurality of ceiling panels 11, the method further comprises connecting at least one additional ceiling panel 11 to the first and second elongate carriers 12 that may not cover a stiffening beam 15.

[0057] The present disclosure has been presented in the context of a ceiling system suspended from a structure above it. However, it will be appreciated that such a ceiling system, with suitable modifications, could be mounted in a different orientation, for example to provide a wall covering.

[0058] The method may further comprise suspending the first and second elongate carriers 12 from an overhead structure. This may be done before the ceiling panels 11 are connected to the elongate carriers 12 and/or before the stiffening beams 15 are connected to the first and second elongate carriers 12.

[0059] These and other features and advantages of the

present disclosure will be readily apparent from the detailed description, the scope of the invention being set out in the appended claims.

[0060] The present disclosure is set forth in various levels of detail in this application and no limitation as to the scope of the claimed subject matter is intended by either the inclusion or non-inclusion of elements, components, or the like in the summary. In certain instances, details that are not necessary for an understanding of the disclosure or that render other details difficult to perceive may have been omitted. It should be understood that the claimed subject matter is not necessarily limited to the particular embodiments or arrangements illustrated herein.

[0061] The accompanying drawings are provided for purposes of illustration only, and the dimensions, positions, order, and relative sizes reflected in the drawings attached hereto may vary. The detailed description will be better understood in conjunction with the accompanying drawings, with reference made in detail to embodiments of the present subject matter, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the present subject matter, not limitation of the present subject matter. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present disclosure without departing from the scope or spirit of the present subject matter. Thus, it is intended that the present subject matter covers such modifications and variations as come within the scope of the appended claims and their equivalents.

[0062] In the foregoing description, it will be appreciated that the phrases "at least one", "one or more", and "and/or", as used herein, are open-ended expressions that are both conjunctive and disjunctive in operation. The term "a" or "an" entity, as used herein, refers to one or more of that entity. As such, the terms "a" (or "an"), "one or more" and "at least one" can be used interchangeably herein. All directional references (e.g., proximal, distal, upper, lower, upward, downward, left, right, lateral, longitudinal, front, back, top, bottom, above, below, vertical, horizontal, radial, axial, clockwise, counter clockwise, and/or the like) are only used for identification purposes to aid the reader's understanding of the present disclosure, and / or serve to distinguish regions of the associated elements from one another, and do not limit the associated element, particularly as to the position, orientation, or use of this disclosure.

Claims

1. A ceiling system comprising:

first and second elongate carriers configured to be suspended from an overhead structure;
a ceiling panel having an elongate shape, the ceiling panel extending between the first and

second elongate carriers and coupled to the first and second elongate carriers; and
a stiffening beam extending between the first and second elongate carriers and connected to the first and second elongate carriers independently from the coupling of the ceiling panel to the elongate carriers;
wherein the shape of the ceiling panel defines an elongate cavity inside the ceiling panel; and
the stiffening beam is positioned within the cavity inside the ceiling panel.

2. The ceiling system of claim 1, wherein the ceiling system comprises a plurality of the ceiling panels.

3. The ceiling system of claim 2, wherein:

at least one of the ceiling panels does not include a stiffening beam positioned within the cavity inside the ceiling panel; and/or
at least two of the ceiling panels have a respective stiffening beam positioned within their respective cavities.

4. The ceiling system, of any preceding claim wherein the stiffening beam is stiffer than the ceiling pane.

5. The ceiling system of any preceding claim, wherein the stiffening beam is directly connected to at least one of the first and second elongate carriers.

6. The ceiling system of any preceding claim, wherein the stiffening beam is connected to at least one of the first and second elongate carriers using a respective coupling member.

7. The ceiling system of any preceding claim, wherein:

the connection between the stiffening beam and at least one of the first and second elongate carriers prevents rotation of the stiffening beam relative to the same elongate carrier; and/or
the connection between the stiffening beam and at least one of the first and second elongate carriers prevents translation of the stiffening beam relative to the same elongate carrier.

8. The ceiling system of any preceding claim, wherein:

the stiffening beam is connected to at least one of the first and second elongate carriers by a respective bolted connection; and/or
the stiffening beam is connected to at least one of the first and second elongate carriers by a respective push-fit connection.

9. The ceiling system of any preceding claim, wherein the ceiling panel has an upper side when connected

to the first and second elongate carriers, and the upper side of the ceiling panel is open, such that, after the stiffening beam has been connected to the first and second elongate carriers, the ceiling panel can be coupled to the first and second elongate carriers over the stiffening beam with the stiffening beam passing through the open upper side of the ceiling panel to be located within the ceiling of the ceiling panel.

10. The ceiling system of any preceding claim, wherein:

the ceiling panel has a lower face when coupled to the first and second elongate carriers, the lower face designed to face a room containing the ceiling system, and the stiffening beam is located on the opposite side of the lower face from the room;

optionally, the ceiling panel has a base comprising the lower face, and first and second side walls extending from respective edges of the base, and the cavity is the space between the first and second side walls;

and, further optionally, the first and second side walls comprise respective distal edges, opposite to the base, and the distal edges are configured to be coupled to the first and second elongate carriers.

11. The ceiling system of any preceding claim, wherein the first and second elongate carriers are configured such that the ceiling panel can be coupled to the first and second elongate carriers by a push-fit connection.

12. The ceiling system of any preceding claim, wherein the ceiling panel is formed from a flexible fibre-based material, optionally felt.

13. The ceiling system of any preceding claim, wherein:

each of the first and second elongate carriers includes at least two suspension points, separated from one another in the elongate direction of the elongate carrier, at which the elongate carrier is suspended from a ceiling;

and, optionally, the ceiling system further comprises a respective suspension hanger directly coupled to each of the suspension points and configured to support the ceiling system from the overhead structure.

14. A method of assembling a ceiling system according to any preceding claim, the method comprising:

- (i) providing the first and second elongate carriers;
- (ii) connecting the stiffening beam to the first and

second elongate carriers; and

- (iii) after (ii), coupling a ceiling panel to the first and second elongate carriers, such that the stiffening beam is positioned within the cavity inside the ceiling panel.

15. The method of claim 14, further comprising coupling at least one additional ceiling panel to the first and second elongate carriers; wherein, optionally, the at least one additional ceiling panel is coupled to the first and second elongate carriers such that a stiffening beam is not positioned inside its cavity.

Fig. 1

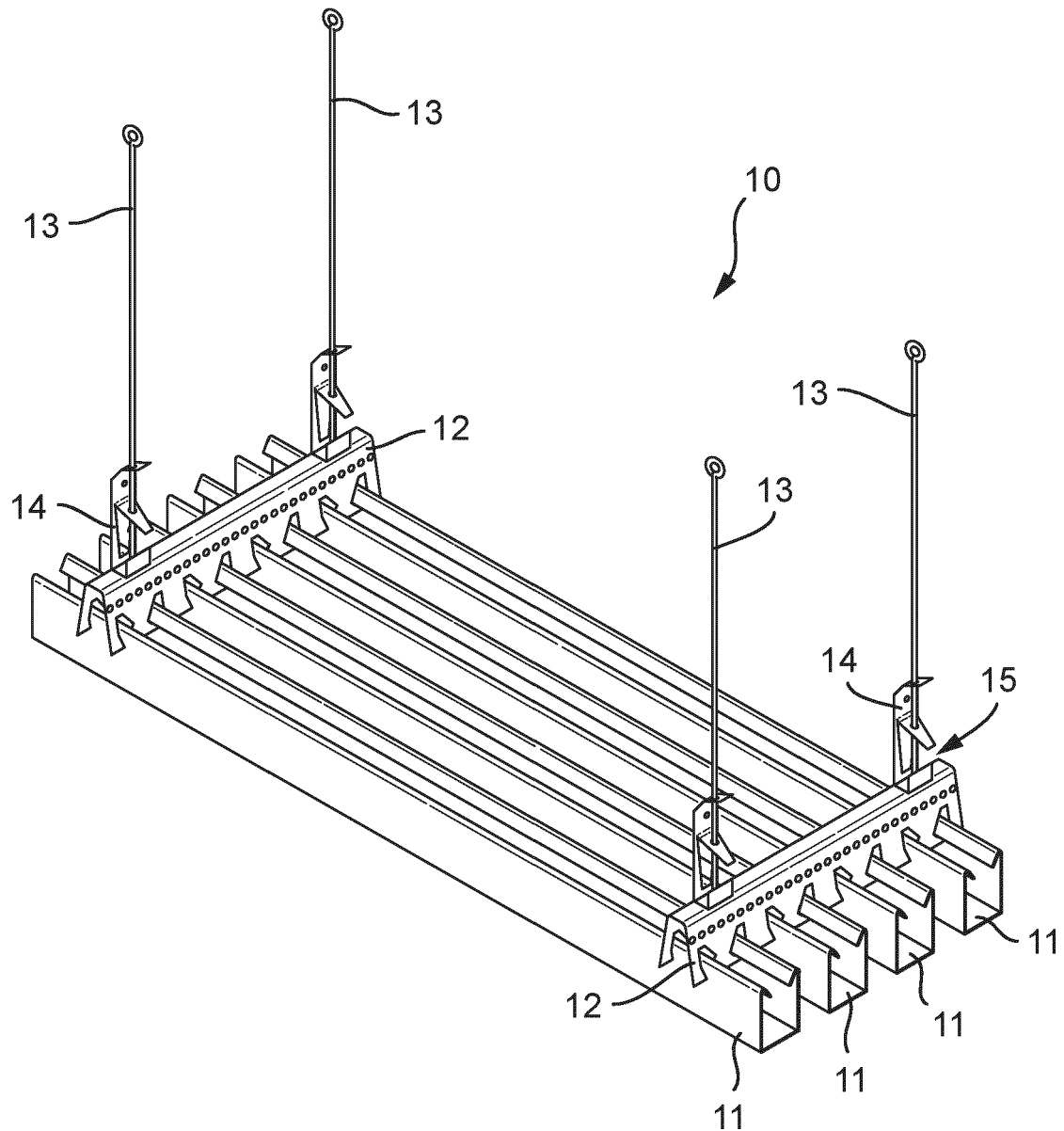


Fig. 2

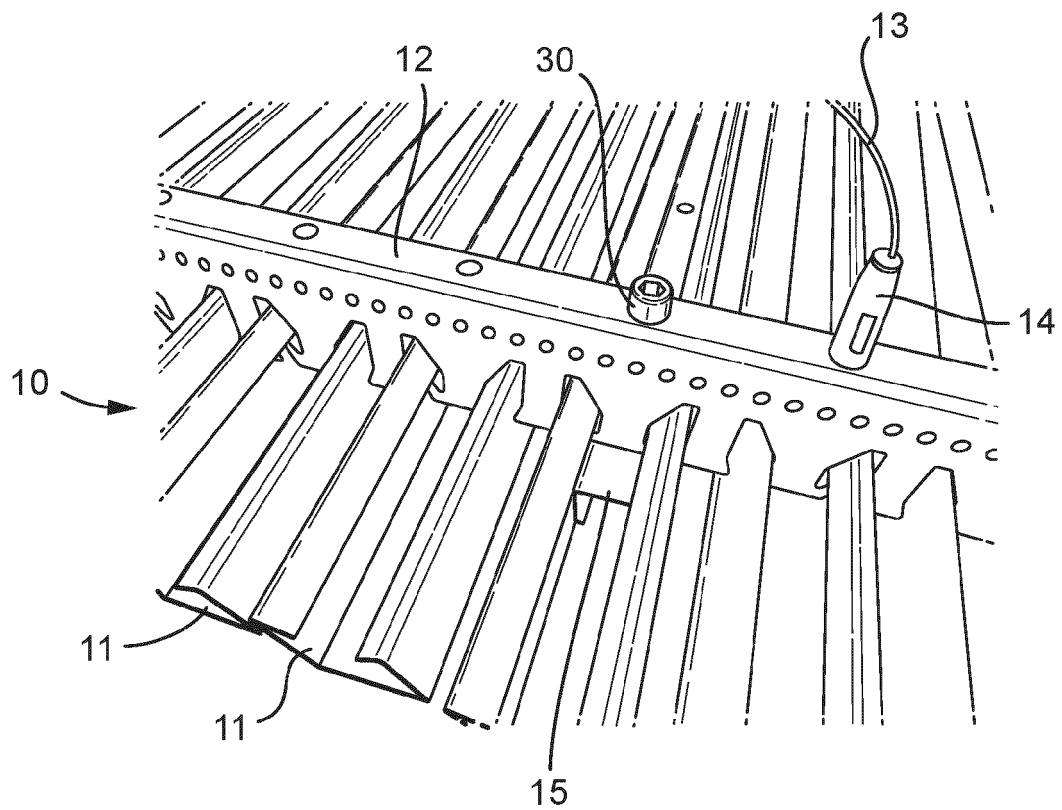


Fig. 3

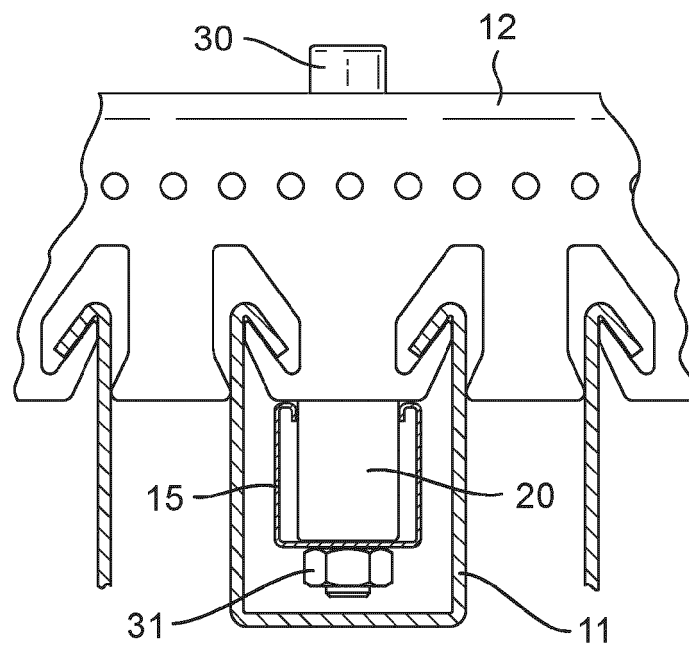


Fig. 4

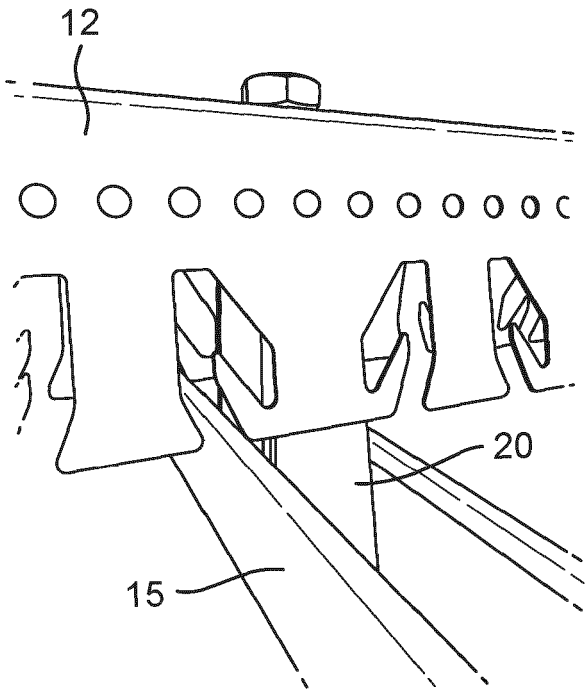
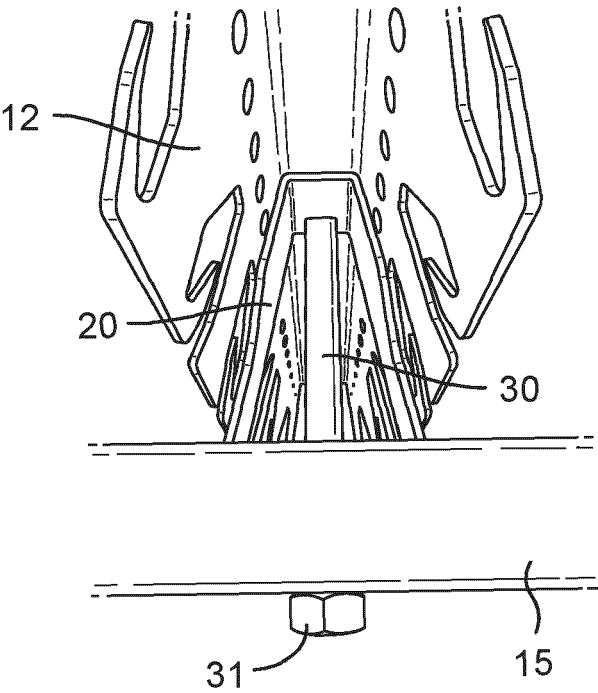


Fig. 5





EUROPEAN SEARCH REPORT

Application Number

EP 24 18 5405

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		3 December 2024	Lopes, Claudia
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