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

(11) Publication number: **0 203 045**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **86850127.1**

(51) Int. Cl.[4]: **F 21 V 21/02**

(22) Date of filing: **14.04.86**

(30) Priority: **23.05.85 SE 8502565**

(43) Date of publication of application:
26.11.86 Bulletin 86/48

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

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(54) Fastening device for carrying an object on a suspended ceiling structure.

(57) A fastening device (1) for carrying a lighting fixture in carrying sections supporting ceiling slabs in a suspended ceiling structure consists of a plate member (1) with a first edge portion (10), at least one gripping finger (11) which projects in the direction of the first edge portion (10), and forming with it a clamping fork for thrusting over the horizontal flange of the carrying section. The plate member (1) further has a second edge portion (17) in the opposite direction to the first portion (10). Both edge portions (10, 17) are mutually parallel and connected by a web (16) so that the gripping finger (11) is placed in the area between the planes of said edge portions (10, 17).

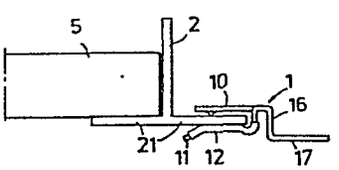

Fig. 2

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TITLE OF INVENTION

Fastening device for carrying an object on a suspended ceiling structure.

TECHNICAL FIELD

The invention relates to a fastening device for carrying an object such as a lighting fixture on a suspended ceiling structure which includes horizontal sections for carrying ceiling slabs, these sections having a horizontal flange.

BACKGROUND ART

There is a plurality of fixing methods for fastening ligting fixtures in ceiling structures of the kind indicated, e.g. those found in the brochure "GullfiberAkustik, Undertak och Inredningsakustik", published May 1981, pages 34-35. In suspended ceiling structures of the kind in question, the ceiling slabs have a predetermined width, e.g. 600 mm the edges of the slabs being carried on the horizontal flanges of horizontal sections mutually spaced in correspondance with the width of the ceiling slabs. The lighting fixtures often have a length corresponding to the width of the slabs and are usually quadratic. Accordling to the prior art, the fixtures can be set into the ceiling between two adjacent supporting sections, the ceiling slab being removed in the area of the fixture, or the fixture can be mounted on the underside of the suspended ceiling structure centrally against a carrying section. In the latter case there is required a fastening which centrally engages against the carrying section and projects downward from it. Such fastenings are designated twist clips and afford attachment of the fixture wih the aid of a screw joint. The known fastenings and fastening elements require time-consuming fixing work and also troublesome dismantling work in the case of possible faults in the fixture or if the fixture is to be moved. Furthermore, the placing of exteriorly located fixtures is limited to positions central on the carrying sections.

One object of the invention is to provide a fastening device, which affords very simple and rapid fixing of a

lighting fixture, affords simple dismantling of the fixture and fastening device should there be a fault in the fixture or if the latter is to be moved, allows placing a fixture of a length corresponding to the width of the ceiling slabs between two adjacent carrying sections, and affords stable and secure fastening of the fixture.

CHARACTERIZATION OF THE INVENTION

A fastening device for carrying an object such as a lighting fixture on a suspended ceiling structure including sections for carrying ceiling slabs, said sections including a horizontal flange, is essentially distinguished by a plate member with a first edge portion and at least one gripping finger which thrusts out in the same direction as the first edge portion, the edge portion and at least one gripping finger which thrusts out in the same direction as the first edge portion, the edge portion and finger being together shaped to form a clamping fork, for thrusting on to the horizontal flange of the section, the plate member having a second edge portion forming a fastening tab for attaching the object. Preferred embodiments of the fastening device are disclosed in the appended claims 2-8.

The sections usually have the shape of an inverted T, possibly excepting those placed adjacent to walls, where the section may be an angle, the vertical leg of which may be directly fastened to the wall. The horizontal legs facing towards each other on adjacent carrying sections thus form seatings for two opposing, parallel edge portions of each ceiling slab. For carrying a fixture in the suspended ceiling structure, there is customarily used at least two fastening devices, namely at least one fastening device on each of the legs facing towards each other of two spaced carrying sections. The ceiling slabs may be laid on the horizontal flanges of the sections where the fastening devices are fixed, and the fastening device can be fixed directly to the flange exposed on the underside of the suspended ceiling.

The invention, which is defined in the appended claims,

will now be described with the aid and example and with reference to the accompanying drawing.

DRAWING

Fig. 1 schematically illustrates a section through a suspended ceiling structure, where a lighting fixture is carried by inventive fastening devices.

Fig. 2 illustrates to a larger scale a fastening device in accordance with the invention fixed to a carrying section for a suspended ceiling, the ceiling slabs of which are placed on the horizontal flanges of the carrying sections.

Fig. 3 is a plan of the fastening device in accordance with the invention.

Fig. 4 is a side view to a larger scale of the fastening device according to Fig. 3, taken along the line IV-IV in the figure.

EMBODIMENT EXAMPLES

Fig. 1 illustrates a suspended ceiling structure comprising mutually parallel carrying T sections 2, the horizontal flanges of which carry the edge portions of ceiling slabs 5. The carrying sections 2 are suspended in a fixed ceiling structure 4 with the aid of vertically adjustable suspension fittings 3. A lighting fixture 6, the length of which corresponds to the centre-to-centre distance between two adjacent carrying sections 2, is fixed to them with the aid of inventive fastening devices 1.

Fig. 2 illustrates T sections 2 with horizontal flanges 21, of which one carries a fastening device 1 in accordance with the invention, and the other carries a ceiling slab 5, on the upper face of its flange. It will be understood that in the embodiment according to Fig. 2 the fastening device 1 may be applied to the flange 21 of a section even when it carries a slab 5.

Turning now to Figs. 3 and 4, it will be seen that the fastening device is formed from a piece of metal plate 1 having a first flat edge portion 10, joined by a web 16 to a

second flat edge portion 17. The edge portions 10 and 17 are substantially parallel and the web 16 is at right angles to them. The edge portion 10, which forms a flange intended for planar engagement against the upper surface of the flange 21 of the carrying section 2, is arranged as a central portion of the plate member length. On either side of the flange 10 there is a gripping finger 11 projecting from the web 16 substantially in the same direction as the flange 10. A length of plastic hose 12 is thrust over each finger 11. The fingers 11 depart from the plan of the flange 10 adjacent the web 16 and the inner part 112 of the finger 11 extends at an angle of approximately 90° to the flange 10. The intermediate part 111 of the finger 11 is substantially parallel to the flange 10. The outmost part 110 of the finger is bent out at an angle to the flange 10 to form a cuneiform insertion gap for the clamping fork formed by the fingers 11 and flange 10.

The flange 10 has punched-out gripping tongues 14, the free ends thereof facing towards the web 16 to reinforce the grip of the device against the flange 21.

The flange 10 may have prebored holes 15 for allowing, where necessary, an extra connection of the device 1 to the section 2 with the aid of a joint, such as a pop rivet joint.

The other end portion 17 of the fastening device, facing away from the first edge portion 10, constitutes a fastening tab against which the fixture 6 can be fastened with the aid of a fastening element, such as a screw. The fixing flange 17 may have prebored holes 18 for facilitating attachement of the fixture 6 to the tab 17.

It will be understood that for a suspended ceiling structure of the kind illustrated in Figs. 1 and 2, the fixture 6 can be screwed to the fixing tabs 17 of the fastening devices 1 mounted on the sections with the aid of screws taken through the holes 18 from above and screwed into the horizontal rear portion of the fixture 6. Accessibility for this screwing operation is offered by quite simply lifting out a ceiling slab adjacent to the fixture in the area between the adjacent carrying sections 2. The fixture 6 often

has a length corresponding to the distance between two carrying sections 2, as is illustrated in Fig. 1, whereby the width of the fixture is often considerably less than its length. The fastening devices 1 can then first be fixed to the fixture 6 (at least one at either end of the fixture) after which the fixture 6 with the devices 1 is lifted up and placed between the sections. In this operation the fixture 6 is placed parallel to the lower surface of the ceiling so that its longitudinal direction forms an acute angle to the longitudinal direction of the sections, the clamping fork openings of the devices being directed towards the flanges with which they shall engage. By turning the fixture so that its longitudinal direction is at right angles to that of the sections the devices are brought into full engagement with the flanges.

It will be understood that the fastening devices 1 may thus be attached to the fixtures 6 beforehand with the aid of glue, spot welds, screws, pop rivets or the like. Particularly when screws are utilized, the tab 17 may have prepared holes 18 in the form of elongate slots, which permit adjustment of the device 1 on the fixture.

An explicit embodiment of the inventive fastening device has been described above, but it should be quite clear that the embodiment can be modified in many different ways within the scope of the invention. Thus, it may be satisfactory with a single gripping finger 11 and a flange portion corresponding to the flange 10 on either side of the gripping finger. In certain cases the flange 10 and the tab 17 may be permitted to lie in substantially the same plane, the web 16 being left out. As an alternative, the tab 16 can extend substantially at a right angle to the plate 10 for connection to an end surface on the fixture 6, e.g. when the end surface is to be contiguous to a wall. Further modifications will be easily understood by one skilled in the art.

Salient advantages of the inventive fastening device are that it can be very easily and quickly fixed to conventional suspended ceiling structures and there also allow rapid

and simple fixing of objects such as lighting fixtures to the devices, that the fastening device in accordance with the invention and the fixture can be very easily fitted and removed for possible faults in the fixture, or if the fixture is to be moved, that the fastening device affords a great degree of freedom in respect of the place of suspension for the object on the suspended ceiling, and that the fastening device affords a stable and secure suspension of the object e.g. a lighting fixture.

As will be seen from Figs. 2, 3 and 4 the fingers 11 are preferably arranged to extend in the area between the planes of both edge portions 10,17, so that the flat rear side of the fixture 6 can be brought into planar engagement against the fastening tab 17 without obstruction from the fingers 11.

The fastening device 1 may be regarded as formed from a piece of plate with two generally parallel edges, which form the free ends of the plates 10,17. The plates 10,17 are normally flat and can form an angle of 180° to each other, as illustrated in Fig. 4, or 90°, as discussed above, or below 0°, if the plates 10,17 and web 16 together have a generally U-shaped cross section. In all cases, the plates may be regarded as extending away from an imagined central line on the plate, said line being generally parallel to the edges of the plate.

CLAIMS

1. Fastening device for carrying an object such as a lighting fixture (6) in a suspended ceiling structure (2-5) including sections (2) for carrying ceiling slabs (5), said sections (2) including a horizontal flange (21), ***characterized*** by a plate member (1) with a first edge portion (10) and at least one gripping finger (11) which projects in the same direction as the first edge portion (10) and which is shaped to form a clamping finger (10,11) in combination with the first edge portion, for thrusting onto the horizontal flange (21) of the section, said plate member (1) having a second edge portion (17) forming a fastening tab for fixing the object.

2. Fastening device as claimed in claim 1, ***characterized*** in that the first and the second edge portion (10,17) are substantially parallel and mutually connected by a web (16), which places the edge portions (10,17) in separate planes, the web (16) having a height such that, in the assembled condition of the fastening device, the second edge portion (17) is placed at a level under the first edge portion (10), preferably at a level under the lower side of the ceiling slabs (5).

3. Fastening devices claimed in claim 1 or 2, ***characterized*** in that the gripping finger (11) is adapted to engage against the underside of the flange (21) of the horizontal section in the assembled state of the fastening device.

4. Fastening device as claimed in any one of claims 1-3, ***characterized*** in that at least one gripping tongue (14) is punched out from the plane of the first edge portion (10), said gripping tongue (14) being directed in the opposite direction to the gripping finger (11) for reinforcing the grip of the clamping fork (10,11) against the horizontal flange (21).

5. Fastening device as claimed in any one of claims 1-4, *characterized* in that the gripping finger (11) has a first inner part (112), starting from the plane of the first edge portion (10) and extending generally in the direction of the web (16), a second part (111) following on to the first part (112) and extending substantially parallel to the plane of the first edge portion (10), and a third part (110) following on the second part (111) and forming with the first edge portion (10) a cuneiform entry gap to the clamping fork, the distance between the second part (111) of the gripping finger (11) and the first edge portion (10) being adapted to offer clamping of the section horizontal flange (21) between them.

6. Fastening device as claimed in any one of claims 1-5, *characaterized* in that a gripping finger (11) is arranged on either side of the first edge portion (10).

7. Fastening device as claimed in any one of claims 1-6, *characterized* in that the fastening device is formed by an integral metal plate (1).

8. Fastening device as claimed in any one of claims 1-7, *characterized* by a length of hose (12) of synthetic plastics material being thrust over the gripping finger (11).

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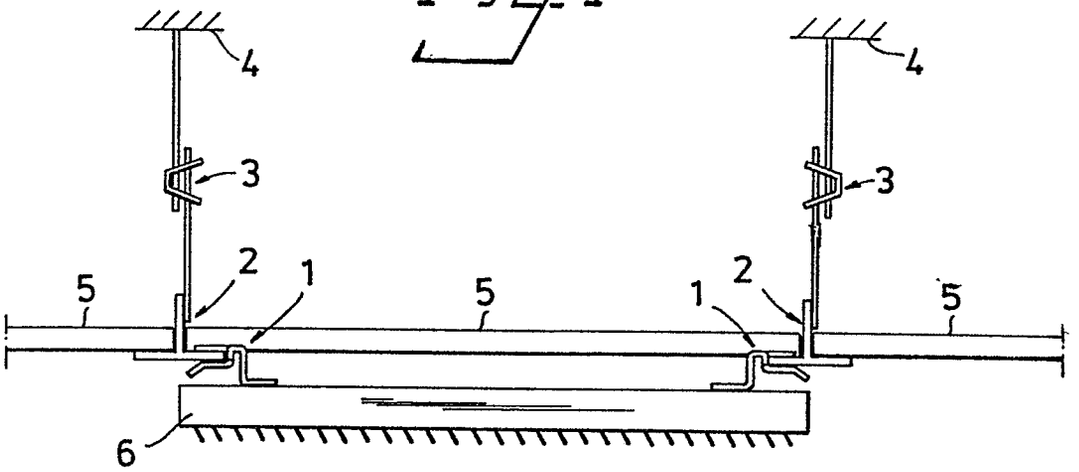
Fig. 1



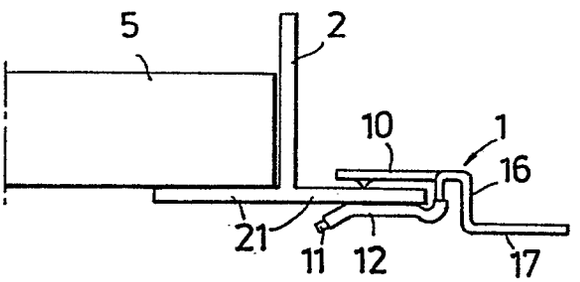


Fig. 2

Fig. 4

Fig. 3