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

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Description

TECHNICAL FIELD

The invention relates to an arrangement wherein a lighting fixture is suspended on a ceiling structure which includes horizontal sections carrying ceiling slabs, these sections having a horizontal flange, as defined in the preamble clause of claim 1.

BACKGROUND ART

There is a plurality of fixing methods for fastening lighting 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. According 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 with 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. US 3 589 660 discloses a device for hanging lighting fixtures below a suspended or dropped ceiling, the dropped ceiling being supported by sections in the form of inverted tees. The device has a body portion from which a pair of spaced apart wing portions depend for lockably engaging the lighting fixture which is inserted between the wing portions. One or two pairs of clips extend above the body portion for attaching the device to an inverted tee such that the device hangs either parallel or perpendicular to the tee. To attach the device, the flat body portion thereof is first placed at an angle to and against the flat lower face 32 of the inverted tee. Thereafter, the device is twisted so that a pair of clips engage the inverted tee.

One object of the invention is to provide a

suspended ceiling structure and lighting fixture arrangement, 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.

SUMMARY OF THE INVENTION

A suspended ceiling structure and lighting fixture arrangement comprises suspended mutually parallel carrying sections having horizontal flanges, horizontal ceiling slabs carried by the opposite horizontal flanges of such mutually parallel carrying sections, fastening devices carried by the horizontal flanges, of the carrying sections, and a lighting fixture suspended in the fastening devices below the ceiling slabs. The lighting fixture extends transversely relative to the carrying sections. Each fastening device includes a plate member having gripping means for fixing the device to the associated carrying section and means for fastening the lighting fixture thereto, said plate member having a first flat edge portion and at least one gripping finger which projects in the same direction as the first edge portion and which is shaped to form a clamping fork in combination with the first flat edge portion, for thrusting onto the associated horizontal flange of the section. The arrangement is essentially characterized in that the clamping fork is thrust on to the flange, such that the first flat edge portion is in planar engagement against the upper surface of the horizontal flange and the gripping finger is in engagement against the underside of the horizontal flange, and in that a second flat edge portion forms a fastening tab for fixing the object, said first and second flat edge portions being substantially parallel and mutually connected by a web which places the flat edge portions in separate planes, the web having a height such that the second flat edge portion is placed at a level lower than the first edge portion and such that the gripping finger extends in the area between the planes of the flat edge portions, the second flat edge portion being fastened to the upper portion of the lighting fixture.

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 of an example and with reference to the accompanying drawings.

DRAWINGS

Fig. 1 schematically illustrates a section through a suspended ceiling structure, where a lighting fixture is carried by fastening devices in accordance with the invention.

Fig. 2 illustrates to a larger scale a fastening device used in accordance with the invention and 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 of Figs 1 and 2.

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 attachment 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.

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 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. A suspended ceiling structure and lighting fixture arrangement, comprising suspended mutually parallel carrying sections (2) having hori-

zontal flanges (21), horizontal ceiling slabs (5) carried by the opposite horizontal flanges (21) of such mutually parallel carrying sections (2), fastening devices (1) carried by the horizontal flanges (21) of the carrying sections (2), and a lighting fixture (6) suspended in the fastening devices (1) below the ceiling slabs (5), the lighting fixture (6) extending transversely relative to the carrying sections (2), each fastening device (1) including a plate member having gripping means (10, 11) for fixing the device to the associated carrying section (2) and means (16, 17) for fastening the lighting fixture (6) thereto, said plate member having a first flat 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 fork (10, 11) in combination with the first flat edge portion, for thrusting onto the associated horizontal flange (21) of the section, characterized in that the clamping fork (10,11) is thrust on to the said flange (21), such that the first flat edge portion (10) is in planar engagement against the upper surface of the horizontal flange (21) and the gripping finger (11) is in engagement against the underside of the horizontal flange (21), and in that a second flat edge portion (17) forms a fastening tab for fixing the object, said first and second flat edge portions (10, 17) being substantially parallel and mutually connected by a web (16), which places the flat edge portions (10, 17) in separate planes, the web (16) having a height such that the second flat edge portion (17) is placed at a level lower than the first edge portion (10) and such that the gripping finger (11) extends in the area between the planes of the flat edge portions (10, 17), the second flat edge portion (17) being fastened to the upper portion of the lighting fixture (6).

2. An arrangement as claimed in claim 1, **characterized** in that the second flat edge portion (17) extends away from the first flat edge portion (10).

3. An arrangement as claimed in any one of claims 1-2, characterized in that the gripping finger (11) has a first inner part (112), starting from the plane of the first flat 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 flat edge portion (10), and a third part (110) following on the second part (111) and forming with the first flat 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 flat edge portion (10) being adapted to offer clamping of the horizontal flange (21) between them.

4. An arrangement as claimed in any one of claims 1-3, **characterized** in that a gripping finger (11) is arranged on either side of the first flat edge portion (10).
5. An arrangement as claimed in any one of claims 1-4, **characterized** in that the fastening device (1) is formed by an integral metal plate.
6. An arrangement as claimed in any one of claims 1-5, **characterized** by a length of hose (12) of synthetic plastics material being thrust over the gripping finger (11).
7. An arrangement as claimed in any one of claims 1-6, **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).
8. An arrangement as claimed in any one of claims 1-7, **characterized** in that the lighting fixture has a length corresponding to the centre-to-centre distance between two parallel carrying sections (2).

Revendications

1. Structure de plafond suspendu et arrangement d'appareil d'éclairage, comprenant des profilés (2) porteurs suspendus, parallèles entre eux, possédant des ailes (21) horizontales, des plaques de plafond (5) horizontales portées par les ailes (21) horizontales opposées de ces profilés (2) porteurs parallèles entre eux, des dispositifs de fixation (1) portés par les ailes (21) horizontales des profilés (2) porteurs et un appareil d'éclairage (6) suspendu dans les dispositifs de fixation (1) en dessous des plaques de plafond (5), l'appareil d'éclairage (6) s'étendant transversalement par rapport aux profilés (2) porteurs, chaque dispositif de fixation (1) comprenant un élément formant plaque ayant des moyens de préhension (10, 11) pour fixer le dispositif au profilé (2) porteur associé et des moyens (16, 17) pour fixer l'appareil d'éclairage (6) à ce dernier, ledit élément formant plaque ayant une première partie rebord plat (10) et au moins un doigt de préhension

(11) qui fait saillie dans la même direction que la première partie rebord (10) et est profilé de façon à former une fourche de serrage (10, 11) en association avec la première partie rebord plat, pour s'emboîter par poussée sur l'aile (21) horizontale associée du profilé, caractérisée en ce que la fourche de serrage (10, 11) est emboîtée sur ladite aile (21), de sorte que la première partie rebord plat (10) est engagée en plan contre la face supérieure de l'aile (21) horizontale et que le doigt de préhension (11) est engagé contre la face inférieure de l'aile (21) horizontale, et en ce qu'une seconde partie rebord plat (17) forme une patte de fixation pour fixer l'objet, lesdites première et seconde parties rebords plats (10, 17) étant sensiblement parallèles et reliées entre elles par une âme (16) qui place les parties rebords plats (10, 17) dans des plans séparés, l'âme (16) ayant une hauteur telle que la seconde partie rebord plat (17) est située à un niveau inférieur à la première partie rebord (10) et que le doigt de préhension (11) s'étend dans la zone entre les plans des parties rebords plats (10, 17), la seconde partie rebord plat (17) étant fixée à la partie supérieure de l'appareil d'éclairage (6).

2. Arrangement selon la revendication 1, caractérisé en ce que la seconde partie rebord plat (17) s'étend dans le sens opposé à la première partie rebord plat (10).
3. Arrangement selon l'une quelconque des revendications 1 et 2, caractérisé en ce que le doigt de préhension (11) possède une première partie interne (112) partant du plan de la première partie rebord plat (10) et s'étendant généralement dans la direction de l'âme (16), une seconde partie (111) faisant suite à la première partie (112) et s'étendant sensiblement parallèlement au plan de la première partie rebord plat (10), et une troisième partie (110) faisant suite à la seconde partie (111) et formant avec la première partie rebord plat (10) un espace d'insertion cunéiforme pour la fourche de serrage, la distance entre la seconde partie (111) du doigt de préhension (11) et la première partie rebord plat (10) étant adaptée pour permettre entre elles le serrage de l'aile (21) horizontale.
4. Arrangement selon l'une quelconque des revendications 1 à 3, caractérisé en ce qu'un doigt de préhension (11) est disposé de part et d'autre de la première partie rebord plat (10).
5. Arrangement selon l'une quelconque des revendications 1 à 4, caractérisé en ce que le

dispositif de fixation (1) est formé par une plaque métallique monobloc.

6. Arrangement selon l'une quelconque des revendications 1 à 5, caractérisé par une certaine longueur de gaine souple (12) en matière plastique synthétique enfilée sur le doigt de préhension (11). 5
7. Arrangement selon l'une quelconque des revendications 1 à 6, caractérisé en ce qu'au moins une languette de préhension (14) est découpée dans le plan de la première partie rebord (10), ladite languette de préhension (14) étant dirigée dans le sens opposé au doigt de préhension (11) pour renforcer la préhension de la fourche de serrage (10, 11) contre l'aile (21) horizontale. 10 15
8. Arrangement selon l'une quelconque des revendications 1 à 7, caractérisé en ce que l'appareil d'éclairage a une longueur correspondant à la distance de centre à centre entre deux profilés (2) porteurs parallèles. 20 25

Patentansprüche

1. Anordnung bei untergehängter Decke und Leuchtenhalterung, mit aufgehängten, zueinander parallelen Profilträgern (2) mit horizontalen Trägerschenkeln (21), durch die gegenüberliegenden Trägerschenkel (21) solcher Profilträger (2) abgestützten Deckenplatten (5), von den Trägerschenkeln (21) der Profilträger (2) getragenen Haltevorrichtungen (1), und einer an den Haltevorrichtungen (1) unter den Deckenplatten (5) aufgehängten Leuchte (6), die sich quer zu den Profilträgern (2) erstreckt, wobei jede Haltevorrichtung (1) ein Blechelement mit Greifeinrichtungen (10, 11) zur Befestigung der Haltevorrichtung am zugeordneten Profilträger (2), sowie Mittel (16, 17) zur Befestigung der Leuchte (6) daran und das Blechelement einen ersten ebenen Randflansch (10) und wenigstens einen in derselben Richtung wie der erste Randflansch (10) vorstehenden Greiffinger (11) aufweist, der mit dem ersten Randflansch eine Klemmgabel (10, 11) zum Aufschieben auf den zugeordneten Trägerschenkel (21) des Profilträgers bildet, dadurch **gekennzeichnet**, dass die Klemmgabel (10, 11) so auf den Trägerschenkel (21) aufgestreckt ist, dass der erste Randflansch (10) in flächigem Eingriff mit der Oberseite des Trägerschenkels (21) und der Greiffinger (11) in Eingriff mit der Unterseite des Trägerschenkels (21) steht, und dass ein ebener zweiter Randflansch (17) eine Haltetasche zum Befestigen 30 35 40 45 50 55

der Leuchte bildet, wobei die ersten und zweiten Randflansche (10, 17) hauptsächlich parallel und durch einen Steg (16) miteinander verbunden sind, der die beiden Randflansche (10, 17) in getrennte Ebenen bringt und eine solche Höhe hat, dass der zweite Randflansch (17) unterhalb des ersten Randflansches (10) zu liegen kommt und der Greiffinger (11) sich im Raum zwischen den Ebenen der Randflansche (10, 17) erstreckt, wobei der zweite Randflansch (17) am oberen Teil der Leuchte (6) befestigt ist.

2. Anordnung nach Anspruch 1, dadurch **gekennzeichnet**, dass der zweite Randflansch (17) sich vom ersten Randflansch (10) weg erstreckt.
3. Anordnung nach Anspruch 1 oder 2, dadurch **gekennzeichnet**, dass der Greiffinger (11) einen ersten Innenteil (112), der in der Ebene des ersten Randflansches (10) beginnt und sich hauptsächlich in Richtung des Steges (16) erstreckt, einen zweiten Mittelteil (111), der sich an den ersten Teil (112) anschliesst und sich hauptsächlich parallel zur Ebene des ersten Randflansches (10) erstreckt, sowie einen dritten Aussenteil (110), der sich an den zweiten Mittelteil (111) anschliesst und mit dem ersten Randflansch (10) eine keilförmige Einführöffnung zur Klemmgabel bildet, aufweist, wobei der Abstand zwischen dem zweiten Mittelteil des Greiffingers (11) und dem ersten Randflansch (10) auf das Festklemmen des Trägerschenkels (21) zwischen denselben abgestimmt ist.
4. Anordnung nach einem der Ansprüche 1-3, dadurch **gekennzeichnet**, dass ein Greiffinger (11) auf beiden Seiten des ersten Randflansches (10) vorgesehen ist.
5. Anordnung nach einem der Ansprüche 1-4, dadurch **gekennzeichnet**, dass die Haltevorrichtung (1) durch ein einstückiges Metallblech gebildet ist.
6. Anordnung nach einem der Ansprüche 1-5, dadurch **gekennzeichnet**, dass ein Schlauchabschnitt (12) aus synthetischem Kunststoffmaterial über den Greiffinger (11) geschoben ist.
7. Anordnung nach einem der Ansprüche 1-6, dadurch **gekennzeichnet**, dass wenigstens eine Greiferzunge (14) aus der Ebene des ersten Randflansches (10) ausgestanzt und dem Greiffinger (11) entgegengesetzt gerichtet ist, um den Griff der Klemmgabel (10, 11) gegen

den Trägerschenkel (21) zu verstärken.

8. Anordnung nach einem der Ansprüche 1-7, dadurch **gekennzeichnet**, dass die Leuchte eine dem Abstand der Mitten zweier paralleler Profilträger (2) entsprechende Länge hat. 5

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