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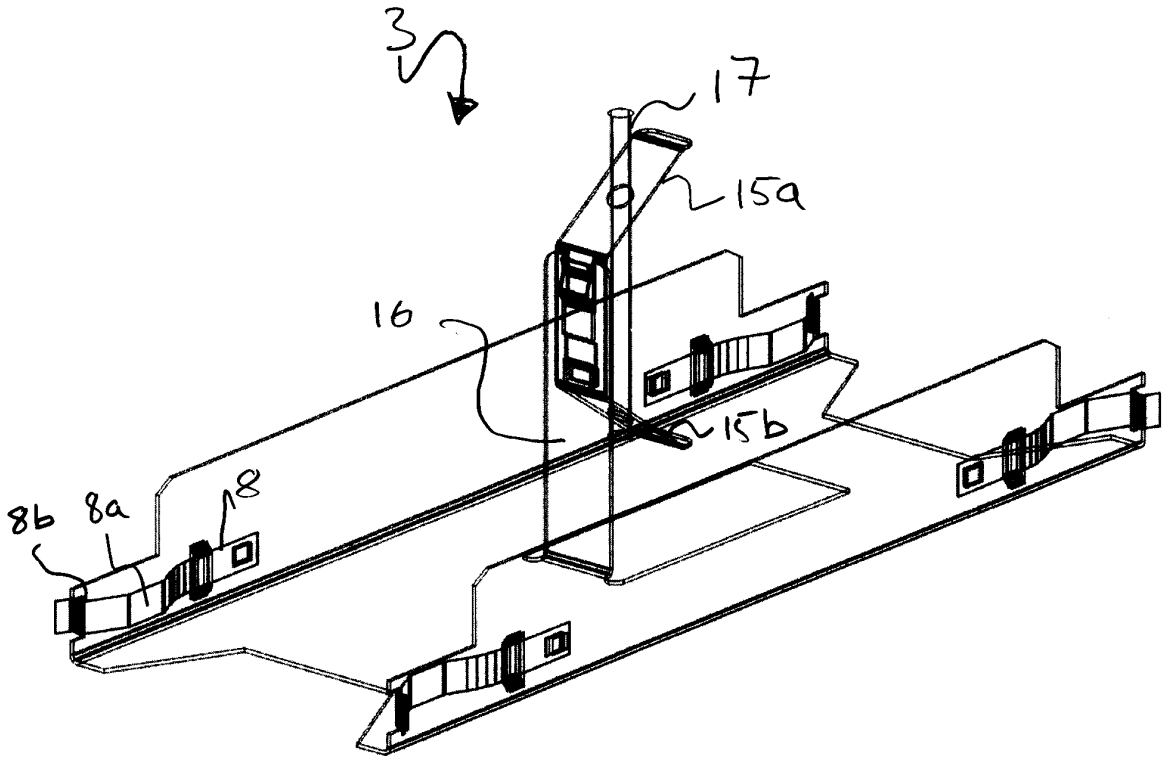
(54) Functional ceiling system

(57) A functional ceiling system comprises primary channels (1) and a hanger (3) for connecting primary channels (1) and optionally provided with brackets (15) for hanging the ceiling system from an existing overhead structure. The primary channels fit overlappingly on the hanger and are secured by means of a releasable first snap locking device (8). Secondary channels (2) for a functional ceiling system as well as a method for mounting said system are also presented.

Fig. 5a



EP 1 741 849 A1

Description

Technical field of the invention

[0001] This invention relates to a functional ceiling system comprising primary channels and a hanger for connecting primary channels and optionally provided with brackets for hanging the ceiling system from an existing overhead structure. It also relates to secondary channels for a functional ceiling system as well as a method for mounting said system.

Background art

[0002] Functional ceiling systems are commonly used in stores of various types, often stores of warehouse type where the floor to ceiling height is significant and/or when unsightly constructional details are present in the original ceiling. A functional ceiling system is then arranged below the original ceiling and provides anchoring points for lighting fixtures, signs, decorations, sound absorbing material, surveillance systems, loudspeakers and so forth. The ceiling systems often comprise U-shaped beams, called primary channels and secondary channels, and some sort of hanger, the latter acting as a connection structure between the channels and also as an anchoring point to the suspension to the original ceiling. The primary and secondary channels, respectively, are mounted perpendicular to each other, meeting in the connection structure of the hanger. Prior art ceiling systems are described in e.g. GB-A-2 240 124, and in the product catalogue "Systems and Components" (provided by TEGO System AB).

[0003] Though functional in many ways, the functional ceiling systems known in the art suffer from several inconvenient drawbacks. One is that there can be a lack of flexibility during the mounting of the secondary channels. They are generally mounted onto the hangers, i.e. only at comparatively few locations along the structure. The coupling of the elements is mostly of a releasable type, either realised by screws or the like or by a hook-like projection which is deformed in some way in order to execute the locking of the coupling. This means that the releasable coupling is either unhandy to perform or can only be performed a limited number of times before the material loses its properties or breaks from fatigue of the material.

[0004] Another problem is that in existing systems an extra device, an electrical conductor, needs to be arranged in order to equalise the electrical potential, i.e. to ground the system.

[0005] In existing systems it is common to connect lighting fixtures to the system, by hanging the fixture from custom-made recesses in the channels and leading the supply wires through openings in the structure. The mounting is generally quite cumbersome.

Summary of the invention

[0006] It is an object of the present invention to provide a solution to the shortcomings and needs previously described as well as other problems.

[0007] A specific object is to provide a more flexible ceiling system.

[0008] This object is achieved by the provision of a functional ceiling system comprising primary channels and a hanger for connecting primary channels and optionally provided with brackets for hanging the ceiling system from an existing overhead structure, given the characteristic features that the primary channel fits overlappingly on the hanger and is secured to it by a releasable first snap locking device.

[0009] The feature of an overlapping fit provides for an increased stability of the system. Further it simplifies the mounting of the system since the overlapping fit secures the primary channel to the hanger in all but one dimension. The simple snap lock device then secures the system in this dimension too. The snap locking device ensures a simple mounting that does not require tools. It further provides a releasable locking that with ease can be effected an almost unlimited number of times. The locking device used in prior art is either cumbersome, in the case of screws or bolts, or can only be carried out a limited number of times, 10-20 in the case of metal wings that are inserted in a slot and bent.

[0010] The snap locking device can comprise a resilient spring device fixed to the hanger engaging the primary channel. The resilient spring device is beneficial since it provides for a secure releasable locking. The simple attachment to the hanger makes it a cost efficient solution of a delicate problem.

[0011] The first snap locking device preferably has two positions, a first rest position where it has its normal length, and a second biased position in which it engages the primary channel and provides for a axial spring force pulling the channel towards the hanger. This makes it particularly easy to secure the primary channel to the hanger.

[0012] The first locking device may comprise a curved plate spring tongue which transforms from the first to the second position when a pressure is applied to the curved section of the spring, increasing the effective length of the spring. This function provides for a simple and secure functioning of the locking device. The procedure of activating the locking device requires no tools and can easily be performed with one hand. The curved design also makes it possible for the first locking device to cope with the tolerance in the system.

[0013] The locking device according to the invention can also provide for potential equalisation between the hanger and the primary channel. This feature is attractive in cases where electrical equipment of some sort is connected to the functional ceiling system. In case of a short circuit or other electrical failure a ceiling system can be charged with a lethal current. To solve this, prior art sys-

tems have separate potential equalising systems, adding complexity to the already complex mounting of the system. Adding the function to an existing component like the locking device consequently saves time and money and, maybe most importantly, it significantly reduces the risk of forgetting this vital function.

[0014] The locking device can comprise at least one sharp edge for provision of electrical contact between the hanger and the primary channel. In cases where the system is lacquered or comprises some other coating, the sharp edges will cut through the coating and ensure an adequate electrical connection.

[0015] A functional ceiling system according to the invention can comprise secondary channels, mounted generally perpendicular to the primary channels. The secondary channels add stability to the system and can provide surface for additional accessories to be mounted on.

[0016] The secondary channels may engage with the primary channels by means of a tongue/recess arrangement, which makes it impossible to mount the secondary channel the wrong way. The tongues can be partially stamped out from the material of an end plate and they consequently provide a firm engagement with the primary channel. The end plates also provide a stabilising effect, suppressing bulging of the channel in case of large channel widths. The end plate can be a separate part, secured onto the secondary channel by any means commonly used, such as welding or similar, but it can also be formed from a bent piece of the bottom or side of the end of the secondary channel.

[0017] An inventive secondary channel for a functional ceiling system has an essentially U-shaped cross section and coupling means are arranged at at least one end of the channel. It is characterised in that the channel comprises a snap lock which activates as the coupling means engages other elements of the functional ceiling system. The snap lock provides a simple mounting of the secondary channel to a functional ceiling system, where the secondary channel is locked into place automatically. In a preferred embodiment the secondary channel is compatible with the inventive functional ceiling system.

[0018] The relative position of the snap lock can obviously be the reversed, with the snap lock located on the primary channel, and so forth.

[0019] The functional ceiling system according to the invention also can comprise a hole provided in the primary channel for the lead-through of electrical wiring and the like. By the provision of holes it is not necessary to lead the supply lines over the edge of the channels and all wiring is hidden in the channel.

[0020] The second snap locking device of an inventive secondary channel preferably comprises a resilient spring device fixed to the secondary channel. As for the previously mentioned spring device this construction is simple, cost efficient and reliable.

[0021] The second snap locking device can also comprise a plate spring tongue, which is particularly easy to fasten to the secondary channel.

[0022] A hole pattern can be provided on a lower surface of the ceiling system for additional accessories to be arranged. The predetermined hole pattern makes it possible to prepare a whole series of accessories that are easy to mount onto the system and that ensure a secure and aesthetic fastening of the accessories to the system.

[0023] When the accessories are lighting fixtures the provision of a specific contact can make the electrical connection automatically or at least very simple after the accessories are slipped into place in the hole pattern.

[0024] A snap lock practically identical to the one used for the secondary channels is preferably used to secure the accessories to the system.

[0025] An inventive method for mounting a functional ceiling system according to the invention comprises the steps of:

- securing the hanger to an existing overhead structure,
- fitting a primary channel overlappingly over the hanger,
- engaging the first snap lock of the hanger with the recess in the primary channel, and
- adding a second hanger to the system and securing it to the existing overhead structure.

Brief description of the drawings

[0026] The invention will in the following be described by means of non-limiting examples referring to the accompanying drawings.

Fig. 1 is an illustration of the ceiling system according to an embodiment of the present invention.
Fig. 2 shows detail A of Fig. 1.
Fig. 3 shows detail B of Fig. 1.
Fig. 4 is a perspective view of a primary channel according to an embodiment of the invention.
Fig. 5a is a perspective view of a hanger according to a first embodiment of the invention.
Fig. 5b is a schematic of a hanger similar to that of Fig. 5a, but according to a second embodiment of the invention.
Fig. 6 is a perspective view of a secondary channel according to an embodiment of the invention.
Fig. 7 is a perspective view of a lighting fixture according to an embodiment of the invention.

Detailed description of preferred embodiments

[0027] The ceiling system of Fig. 1 comprises generally U-shaped primary and secondary channels 1, 2, and hangers 3. Along the system a repetitive hole pattern 4, 5 is arranged, the position of which can be based on the needs of a specific customer. The hole pattern 4 for coupling of additional secondary channels is found on the

sides of the channels and the hole pattern 5 in the bottom of the channels 1, 2 provides a fastening structure for lighting fixtures 6, loudspeakers and so forth, as well as for the lead-through of supply lines.

[0028] The primary channels 1 of Fig. 4 have an open U-design with open ends and an inwardly bent flange 7 on the uppermost part of each leg.

[0029] The hanger 5, see Fig. 5a, is preferably constructed from a bent piece of sheet material. It comprises first snap locks in the form of plate springs 8 which provide a force directed in the axial direction towards the centre of the hanger 3 . When mounted, the primary channels 1 are slipped onto the hanger 3 after which the spring 8 by depressing the curved portion 8a is elongated until it snaps into a recess 9 on the primary channel. It thereby provides for a tensile force holding the system together. The spring 8 is a curved plate spring tongue.

[0030] The plate springs 8 are fastened on the hanger 3 in accordance with Fig. 5a, that is, their one end is slipped under a "bridge" stamped out of the material of the hanger and a hole in said one end is slipped over a pin element, the pin being partially stamped out of the material and with a free end in a direction pointing away from the bridge, such that the tensile force of the coupling will secure the plate spring 8 to the hanger 3.

[0031] In the embodiment shown in Fig. 5b the first snap locks comprises a plate 108, partially stamped out of the hanger 103 and slightly bent out of alignment with the hanger wall. This plate 108 will in a similar fashion as the plate spring 8 snap into a recess of the primary channel 1, thus holding the primary channel 1 to the hanger 103 in a secure manner.

[0032] In the embodiment shown in Fig. 5a the tongue comprises sharp edges 8b at the contact point with the primary channel 1, whereby the system is potential equalised/grounded. The sharp edges 8b will scrape of possible coating from the primary channel 1 and thus ensure an adequate electrical contact.

[0033] The sides and the bottom of the secondary channels 2 are similar to the primary channels 1, but at their ends they are provided with an end plate 10 comprising coupling and locking means 11, 12, see Fig. 6. This plate 10 can either be a separate part fixed to the secondary channel through a method known in the art, or have one side integrated with the channel. The uppermost part of the end plate is bent outwardly into a flange 13. The flange 13 will serve two purposes. Firstly, when the secondary channel is mounted onto an existing system, it will engage with the upper rim, the upper flange 7 of the primary channel 1 in this case, and add to the stability of the system. Secondly, the flange 13 will serve as protective means for supply lines that are lead from the primary channel 1 into the secondary channel 2.

[0034] The coupling means 11 at the ends of each secondary channel 2 comprise several fastening tongues 11 for engagement with the hole pattern 4 on the primary channels 1, the tip of which tongues 11 points downwardly. The tongues are designed to withstand vertical and horizontal torques, since they are arranged at a distance from each other, both in the horizontal and vertical direction, as well as vertical and horizontal forces. The horizontal forces are absorbed by the sides of the tongues 11 and the downwardly directed forces are absorbed by the tongues 11 and the flange 13 on the end plate. If a secondary channel is attached to one side of the primary channel 1 or the hanger 3 these components 1, 3 will tend to tilt and swing, due to the weight and torque induced by the secondary channel 2. The above construction prevents, to a large extent, this from happening. The upwardly directed forces are absorbed by the locking means 12, which is described in more detail in the following.

[0035] The locking means 12 comprises a second snap lock in the form of a plate spring tongue 12 fastened to the secondary channel 2 and having an engaging part 14 protruding through a hole in the end plate 10. When the coupling tongues 11 of the secondary channel 2 are pressed towards the recesses of the hole pattern 4 in the primary (or secondary) channel 2, the tongues 11 will enter the recesses 4 while the engaging part 14 of the locking means 12 will be pushed into the wall of the primary channel 1 and thus be pressed into the secondary channel 2. The secondary channel 2 is then pulled downwards for the tongues 11 to engage fully with the recesses 4 and at a certain point the locking means 12 will engage with a recess in the primary channel 1. At this point the secondary channels 2 locks onto the primary channel 1 and the only way of removing it is to push the engaging part 14 of the locking means 12 back into the secondary channel 2 simultaneously as the secondary channel 2 is pushed upwards.

[0036] This second snap lock can also, similar to what was the case for the first snap lock, comprise a plate that is partially stamped out of the material of the end plate.

[0037] The hanger 3 includes hanger means, brackets, 15 to secure the hanger, and thus the ceiling system, to an existing ceiling. The hanger means comprises two legs 15a and 15b, which are fastened at their one end to a bent-up piece 16 of the hanger 3. A hole is arranged near a free end of each of the two legs. By pressing the free ends towards each other the legs 15a, 15b can be pushed onto fastening means 17, e.g. a rod, wire or similar that fits snugly through the holes. When the legs are released they will grip the fastening means with a "Chinese fingers"-type action preventing the hanger from moving upwards or downwards unless the free ends of the legs 15a, 15b are pressed towards each other. In the preferred embodiment the fastening means (17) comprise a threaded rod, screwed in an anchoring structure above, directly to a concrete ceiling or similar. The threaded rod makes it possible to first slide the fastening means over the rod according to the above description, thus making a coarse adjustment of its position, and later to make a fine adjustment in the direction along the axis made out by the threaded rod by rotating the hanger around said axis.

[0038] In Fig. 7 a lighting fixture 6 according to one aspect of the invention is shown. The lighting fixture 6 comprise two parts: a screen element 18, which essentially is a piece of sheet material bent to a suitable shape, and a body element 19, which carries the fluorescent lamps and all electrical elements such as connectors, glow switches etc. The body element 19 is attached to the inside of the screen element 18 and the connectors 20 extend through a hole 21 in the screen element. The connector 20 may be of a type commercialised by Wieland (gesis®) which enables a snap fit of the power supply 22 and that the lighting fixture does not have to be custom made for a certain phase since the choice of active phase is performed by the choice of T-connector 22. The general feature of choosing phase is essential in that it is thereby possible to at least to an extent control the amount of light provided to an area, since each phase will control a selected number of lighting fixtures. By using said electrical connector 22 the connector 20 will be accessible through a recess 5 in the bottom of the channel 1, 2 after the fixture 6 have been mounted. This in combination with the T-coupling 22 provides for a simple connection system.

[0039] The screen element further comprises tongues for a sliding fit to the hole pattern 5 in the primary channel 1 and a snap locking spring, similar to the one earlier described in the context of the secondary channel 2, for locking of the lighting fixture 6 to the primary or secondary channel 1 or 2.

[0040] The system of the invention is preferably constructed from metal sheet material, which may be lacquered in order to provide a suitable finish. Other materials are also possible, such as plastics or similar, but when an internal potential equalisation is to be performed or when fire safety is an issue, sheet metal is the obvious choice.

Claims

1. A functional ceiling system comprising primary channels (1) and a hanger (3; 103) for connecting primary channels (1) and optionally provided with brackets (15) for hanging the ceiling system from an existing overhead structure, **characterised in that** the primary channels (1) fit overlappingly on the hanger (3; 103) and is secured to it by a releasable first snap locking device (8; 108).

2. The functional ceiling system according to claim 1, wherein the first snap locking device comprises a resilient spring device (8; 108) fixed to the hanger (3; 103) engaging the primary channel (1) or vice versa.

3. The functional ceiling system according to claim 1 or 2, wherein the first snap locking device (8) has two positions, a first rest position where it has its normal length, and a second biased position in which it engages the primary channel (1) and provides for an axial spring force pulling the channel (1) towards the hanger (3).

4. The functional ceiling system according to claim 3, wherein the first locking device comprises a curved plate spring tongue (8) which transforms from the first to the second position when a pressure is applied to a curved section (8a) of the spring, increasing the effective length of the spring (8).

5. The functional ceiling system according to any of the preceding claims, wherein the first locking device (8) provides for potential equalisation between the hanger (3) and the primary channel (1).

6. The functional ceiling system according to any of the preceding claims, wherein the first locking device (8) comprises at least one sharp edge (8b) for provision of electrical contact between the hanger (3) and the primary channel (1).

7. The functional ceiling system according to any of the preceding claims, further comprising secondary channels (2), mounted generally perpendicular to the primary channels (3).

8. The functional ceiling system according to claim 7, wherein the secondary channels (2) engage with the primary channels (1) by means of a tongue/recess arrangement (4, 11).

9. The functional ceiling system according to any of claims 1-8, wherein a hole (21) is provided in the primary channel for the lead-through of electrical wiring and the like.

10. The functional ceiling system according to claim 7 or 8, wherein the secondary channels (2) are secured to the primary channel (1) by means of a second snap locking device (12).

11. The functional ceiling system according to claim 8 or 10 wherein the second snap locking device comprises a resilient spring device (12) fixed to the secondary channel (2).

12. The functional ceiling system according to claim 11, wherein the second snap locking device comprises a plate spring tongue (12).

13. The functional ceiling system according to any of claims 1-12, further comprising a hole pattern (5) on a lower surface of the ceiling system for additional accessories to be arranged.

14. The functional ceiling system according to claim 13,

wherein the accessories are lighting fixtures (6) and wherein an electrical connection (20, 22) of the lighting fixtures (6) is easily facilitated through the bottom of the ceiling system as the accessories are mounted onto the ceiling system.

15. Secondary channel (2) for a functional ceiling system, said secondary channel (2) having an essentially U-shaped cross section, wherein coupling means (11) are arranged at at least one end (10) of the channel (2), **characterised in that** the channel (2) comprises a snap lock (12) which activates as the coupling means (11) engages other elements of the functional ceiling system.

16. Secondary channel (2) according to claim 15, wherein said channel is compatible to the functional ceiling system according to claims 1-13.

17. Method for mounting a functional ceiling system according to any of claims 1-6, comprising the steps of:

- securing a first and a second hanger (3) to an existing overhead structure,
- fitting a primary channel (1) overlappingly over the first and the second hanger (3),
- engaging the first snap lock (8; 108) of the first hanger (3) with the recess (9) in the primary channel (1), and
- engaging the first snap lock (8; 108) of the second hanger (3) with the recess (9) in the primary channel (1).

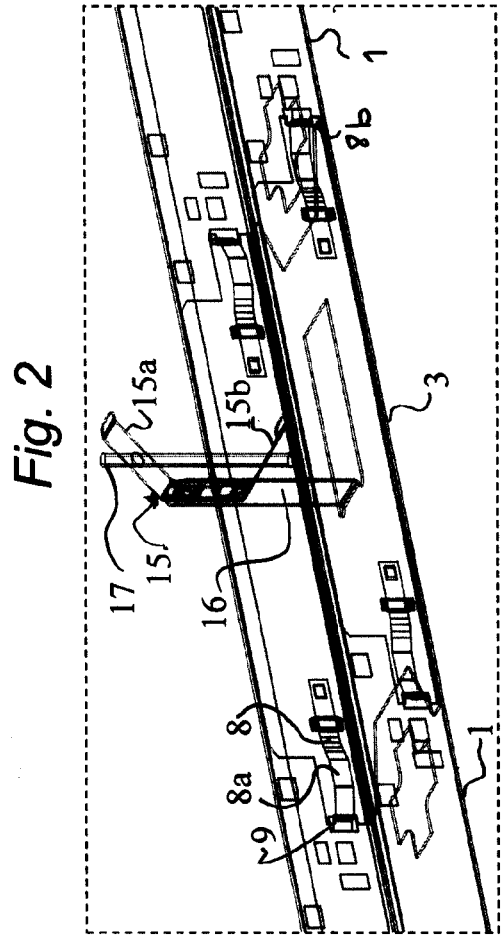


Fig. 2

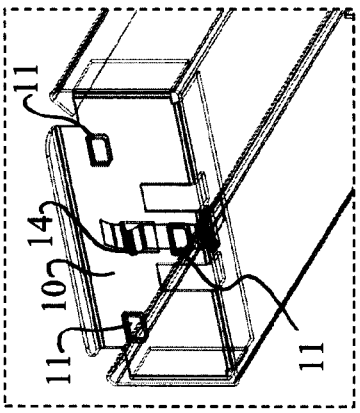


Fig.3

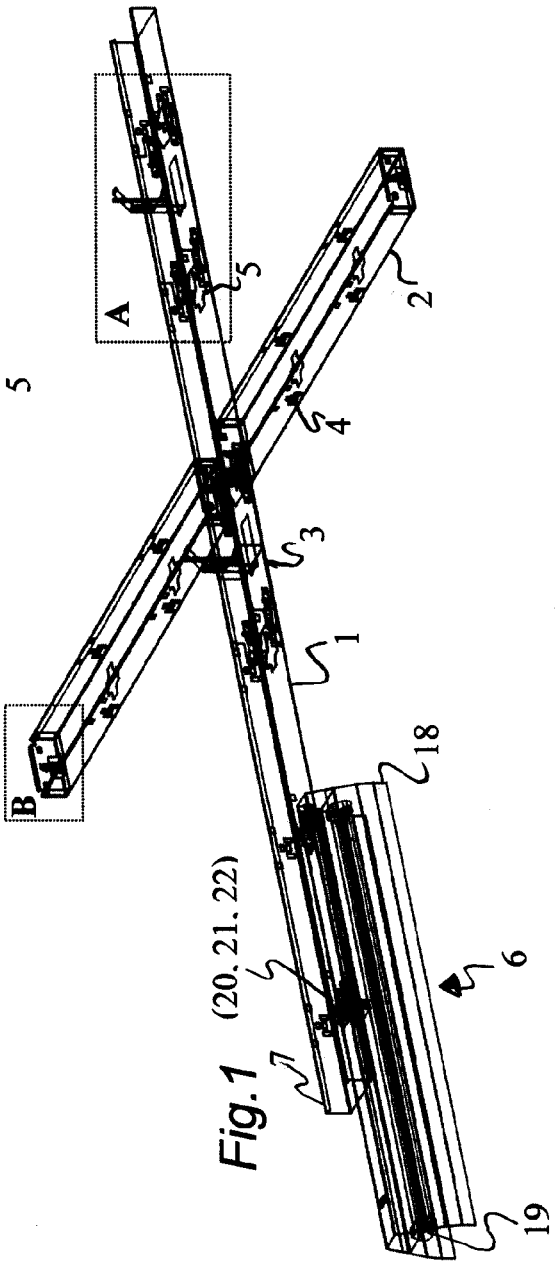


Fig.1

Fig. 4

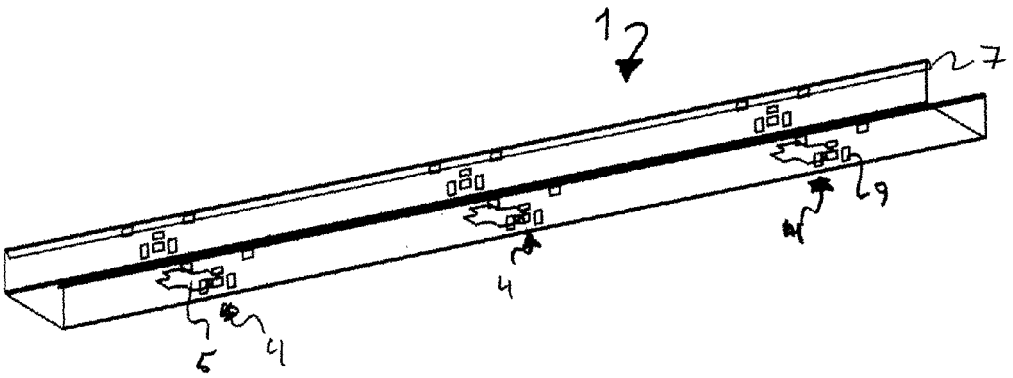


Fig. 5a

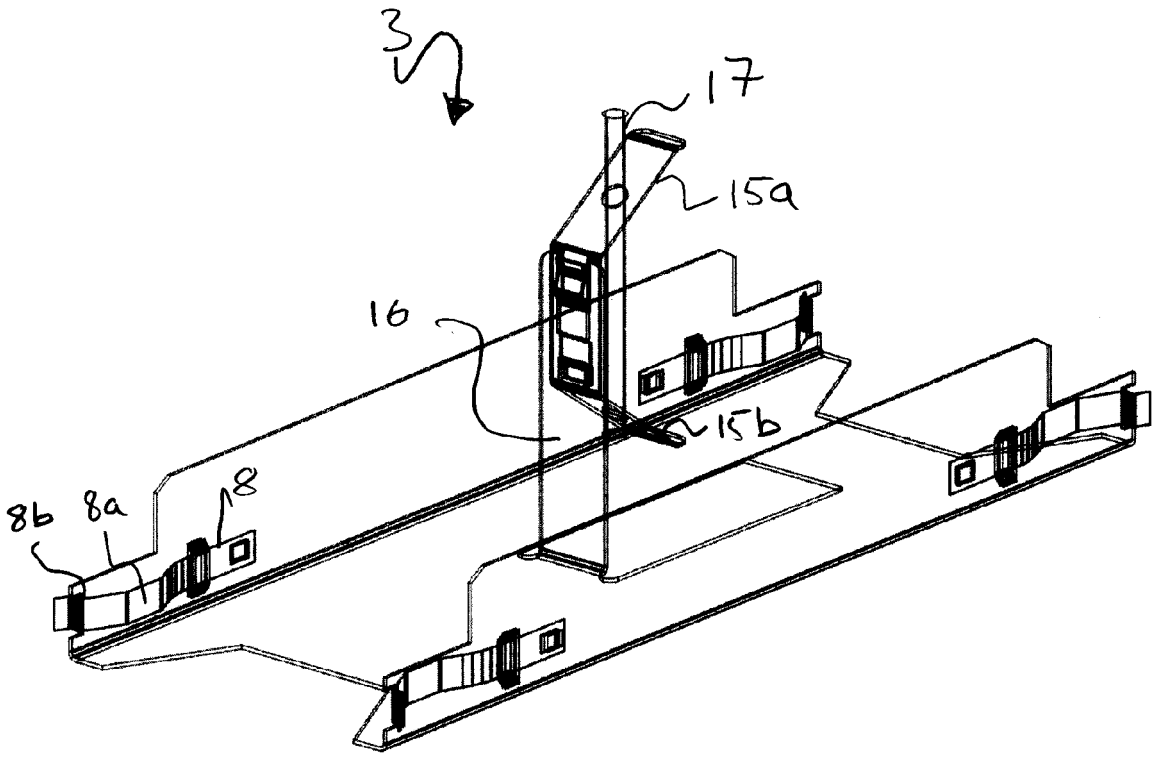
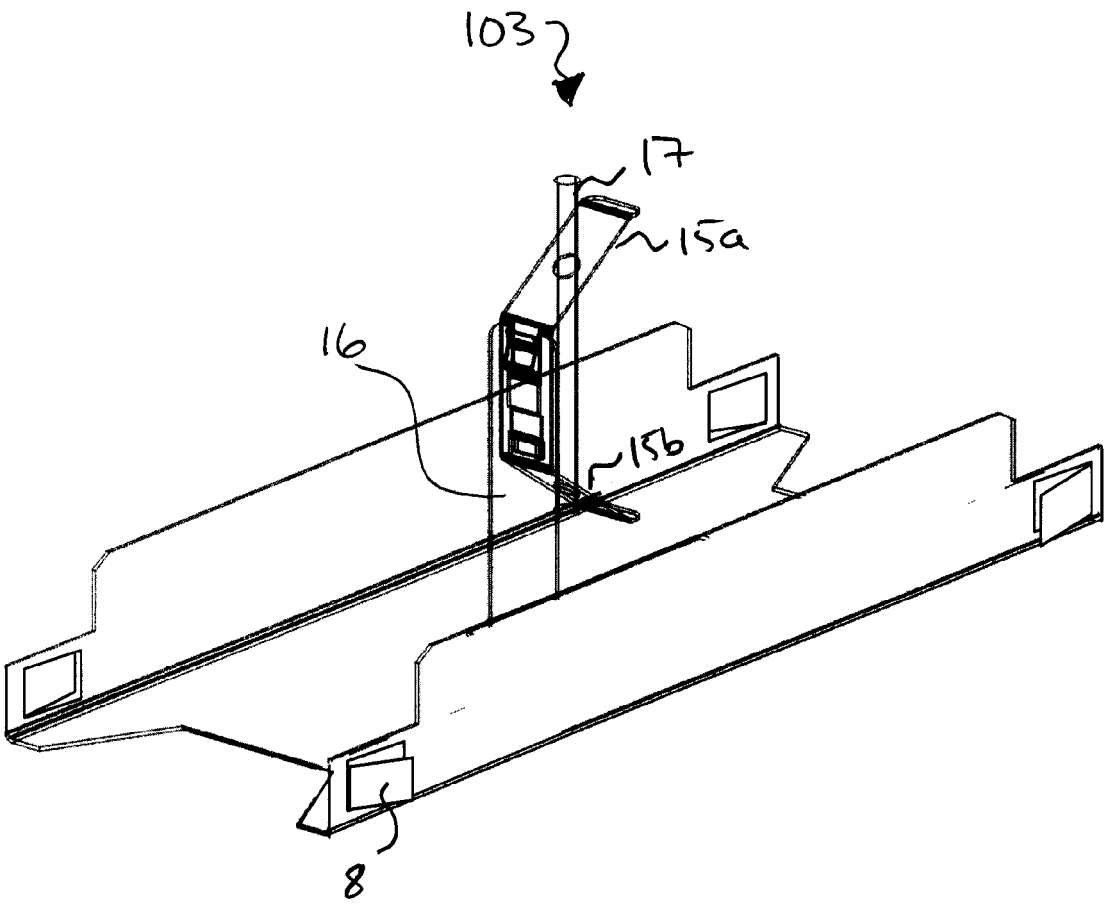


Fig. 5b



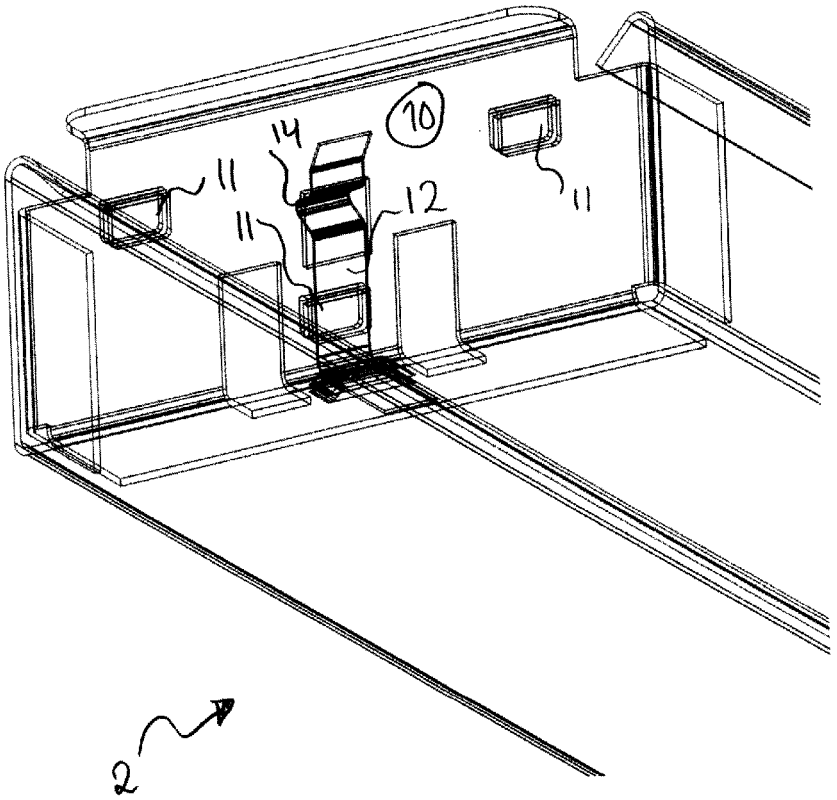
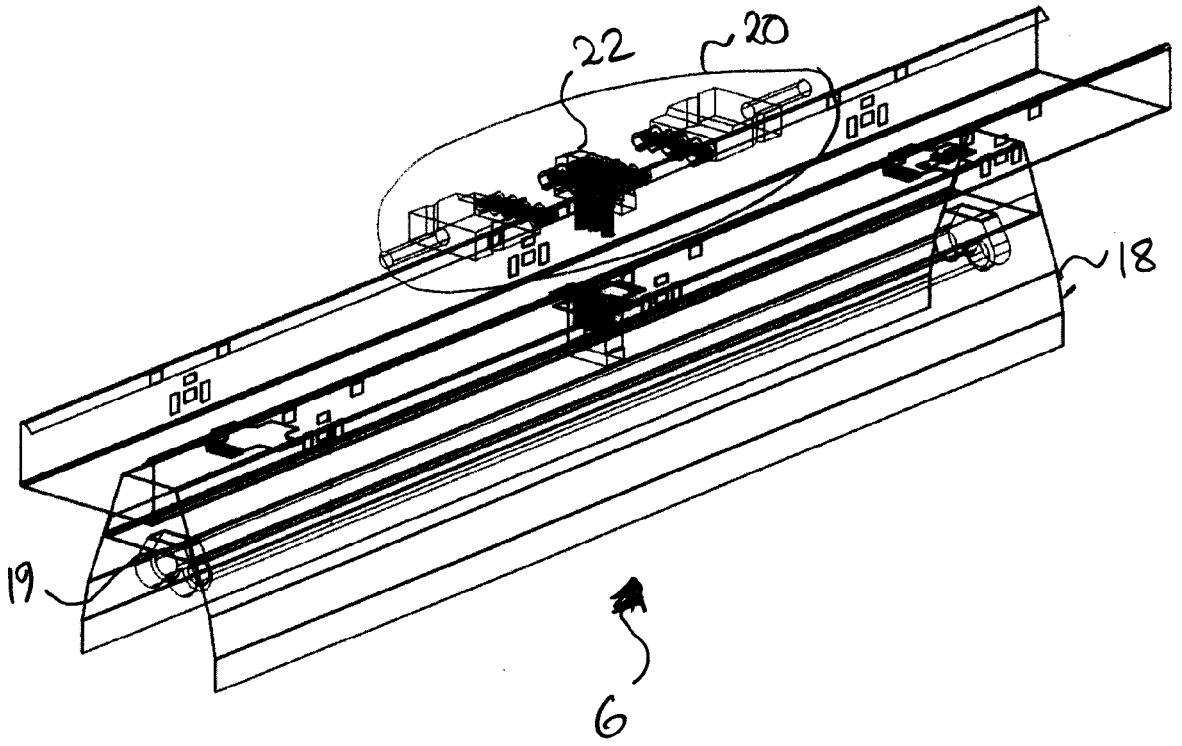


Fig. 6

Fig. 7



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 6257

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	FR 2 590 304 A (CHAMAYOU GERARD) 22 May 1987 (1987-05-22) * page 5, line 4 - line 17; figures 2,5,6 * -----	1-3,5-7, 9,13,14, 17	INV. E04B9/20 E04B9/12
X	EP 0 269 830 A (JAERNKONSTRUKTIONER AB) 8 June 1988 (1988-06-08) * column 5, line 10 - line 12; figures 5-7 * -----	1-3,5-7, 17	
X	DE 85 25 753 U1 (PROFIL-VERTRIEB GMBH, 7560 GAGGENAU, DE) 7 November 1985 (1985-11-07) * figures * -----	1-6,9, 13,14,17	
X	DE 201 01 732 U1 (KOENIG GMBH & CO. KG) 14 March 2002 (2002-03-14) * abstract; figures 1,2 * -----	1-3,5,6, 13,14,17	
X	DE 34 09 992 A1 (KIMMEL,GEORG) 3 October 1985 (1985-10-03) * page 8, paragraph 2; figure 3 * -----	1-3,5,6, 13,14,17	TECHNICAL FIELDS SEARCHED (IPC) E04B

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	19 December 2005	Demeester, J

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

2

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 05 10 6257

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-14, 17

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 05 10 6257

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-14, 17

Ceiling system with a primary channel and a hanger and method for mounting such a ceiling

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2. claims: 15, 16

A secondary channel for a ceiling system

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 10 6257

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
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19-12-2005

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

REFERENCES CITED IN THE DESCRIPTION

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