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(54) **Tile for a suspended ceiling system**

(57) The invention relates to a tile for a ceiling suspension system, the tile having a substantially rectangular shape and comprising:
- a metal plate extending from a first edge of the tile to the opposite second edge of the tile, wherein the metal plate has at least one cavity; and
- a fire resistant layer arranged on the metal plate on the outside of the cavity.

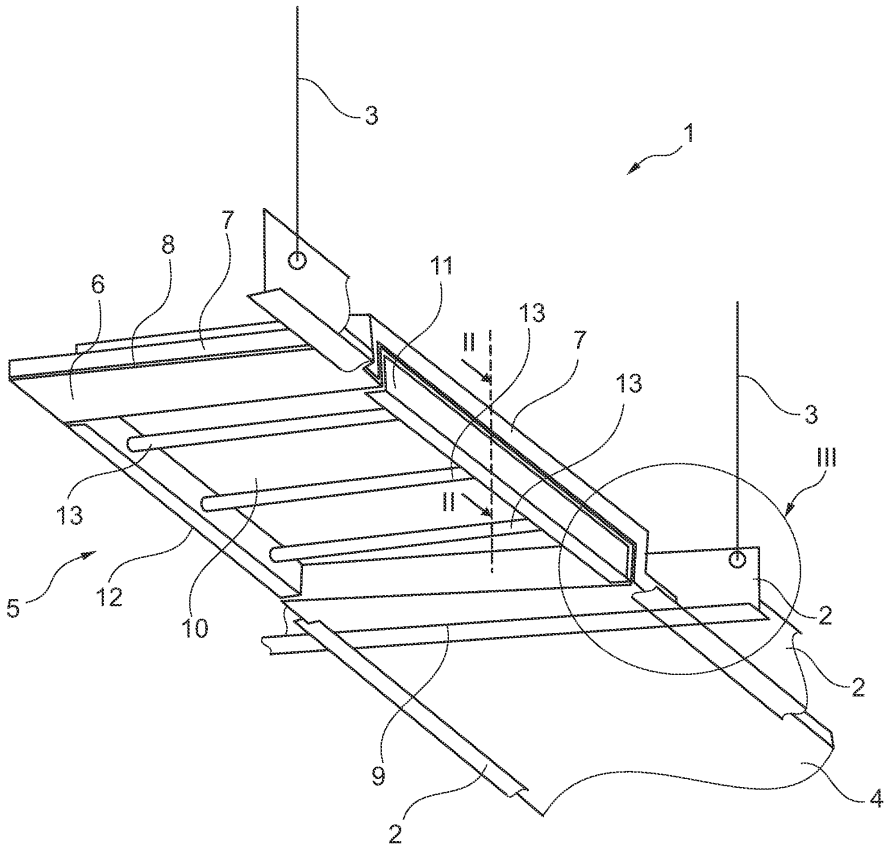

Fig. 1

EP 2 527 555 A1

Description

[0001] The invention relates to a tile for a ceiling suspension system, the tile having a substantially rectangular shape.

[0002] A ceiling suspension system is typically built out of metal members, which are suspended from the ceiling and which members provide a grid in which tiles are positioned. Such a suspended ceiling with tiles is typically used for sound reduction or for concealing air ducts and cables. The grid could be like a checkerboard with rectangular meshes in which tiles are arranged or it could be more like tracks between which the tiles are arranged in rows.

[0003] Sometimes a suspended ceiling needs to be fire retardant. By using a suitable material for the tiles, the fire retardant requirements can be met. Typically, this is tested and approved by a testing institute.

[0004] However, lights, air ducts, fire alarms, speakers and so on need to be integrated in such a suspended ceiling. This requires providing holes in the tiles to mount these devices. As a result the fire retardancy of the ceiling is compromised.

[0005] It is known in the prior art to arrange a blanket of fire resistant material over a device mounted in the ceiling. Another solution known from EP 1564339 is a housing of fire resistant material being arranged over the device and fixed to the ceiling suspension system.

[0006] A disadvantage of these systems is that no visual check can be performed on the correct installation of the fire protection, without having to remove tiles from the ceiling. Especially with blankets, a substantial chance is present that the blankets slide off the devices they should protect. The misplacement of the blankets could be a result of maintenance performed on the ceiling. For example, when a light fixture is removed from the ceiling and replaced, it could well be that the maintenance person forgets to reposition the blanket for optimal protection.

[0007] It is an object according to the invention to reduce or even remove the above mentioned disadvantages.

[0008] This object is achieved according to the invention with a tile for a ceiling suspension system, the tile having a substantially rectangular shape and comprising:

- a metal plate extending from a first edge of the tile to the opposite second edge of the tile, wherein the metal plate has at least one cavity; and
- a fire resistant layer arranged on the metal plate on the outside of the cavity.

[0009] The tile according to the invention has a metal plate extending over the full width of the tile and is provided with a fire resistant layer. This ensures that the suspended ceiling still conforms to the fire retardant requirement, when a tile according to the invention is mounted in the ceiling. In addition, at least one cavity is provided in the tile to accommodate any desired device.

[0010] Because the invention provides a full sized tile for a ceiling suspension system, the fire retardancy of the ceiling is not compromised. By further providing a cavity in the tile, space is present to mount devices in. Although this space is provided below the fire retardant tile, the cavity enables the integration in the ceiling, such that the devices can be concealed.

[0011] With the tile according to the invention, it is no longer necessary to cut holes in tiles. All the necessary devices can be arranged below the tile and concealed within the ceiling because of the at least one cavity.

[0012] In an embodiment of the tile according to the invention the metal plate is spaced apart from the third and fourth edge of the tile. The metal plate will expand when the metal plate is heated due to a fire. By having the metal plate spaced apart from the third and fourth edge expansion space is created in which the additional length of the metal plate, when heated, is accommodated.

[0013] In a preferred embodiment of the tile according to the invention the metal plate has a U-shaped cross section to provide the cavity. A metal plate with a U-shaped cross section is easily manufactured and provides a well defined cavity in which devices can be mounted.

[0014] A very preferred embodiment of the tile according to the invention further comprises restriction elements extending between the first and second edge for restricting the expansion of the metal plate.

[0015] The restriction elements contain the dimensions of the metal plate between the first and second edge. When the metal plate is heated, it could expand without the restriction elements beyond the dimensions of the tile, which could result in deformation of part of the complete ceiling. Especially with fire, such deformation could create parts in the ceiling, where the fire retardancy is substantially reduced.

[0016] In a further embodiment of the tile according to the invention the restriction elements are strips having a thickness substantially larger than the thickness of the metal plate. Preferably the thickness of the strips is at least twice the thickness of the metal plate.

[0017] Because the strips are substantially thicker than the metal plate, the strips will substantially keep their shape and dimensions, such that the metal plate is also kept between the dimensions of the tile. The metal plate can be made from a thinner material, which would generally has the tendency to deform more when heated. The restriction elements will prevent this.

[0018] In another embodiment of the tile according to the invention each restriction element comprises two spaced apart, parallel strips with a fire resistant layer interposed in between. The restriction element has an increased strength by using two parallel strips. By arranging a fire resistant layer in between, the strength is further increased, especially against bending. Furthermore, the fire resistant layer also provides the necessary resistance

against fire for the side surface embodied by the restriction element. Optionally, a heat foamable tape could be arranged between the two strips. This strip will expanded when heated by fire and close off any space still present between the fire resistant layer and the remaining parts of the tile.

[0019] In yet another preferred embodiment of the tile according to the invention the edges of the metal plate are connected to the restriction elements and the restriction elements border the cavity.

[0020] The dimensions of the metal plate are further contained by connecting the metal plate to the restriction element. In particular, when the metal plate has a U-shaped cross section, the restriction elements will close off the cavity, such that a box like space is created in which different devices can be mounted.

[0021] In still another preferred embodiment of the tile according to the invention the metal plate is provided with weakened zones. When the metal plate is heated, it will try to expand. By arranging weakened zones in the metal plate, the expansion of the metal plate can be controlled in order to prevent the tile to expand beyond the original dimensions of the tile or to prevent excessive buckling.

[0022] In yet another preferred embodiment of the tile according to the invention lights, preferably fluorescent lighting, are arranged in the cavity.

[0023] It is further preferred that a heat foamable tape is arranged on the edges of the tile. When the tile according to the invention is heated by a fire, the heat foamable tape will expand and close off any cracks between adjacent tiles or metal members of the ceiling suspension system.

[0024] The foamable tape can also be used on other positions of the tile according to the invention, to close off any holes or cracks when a fire is burning around the suspended ceiling.

[0025] In a further embodiment of the tile according to the invention, the tile further comprises a single suspension element for suspending the tile to a ceiling. Preferably, the suspension element is a flexible cable, like a steel cable.

[0026] This suspension element ensures that the weight of the tile is not fully supported by the metal members of suspended ceiling.

[0027] The single suspension element also ensures that the tile can freely move within the plane of the suspended ceiling, while the height of the tile is fixed. In particular during a fire, the metal members of the suspended ceiling are unevenly heated and tend to buckle and twist. As a result the tiles will be shifted to and fro. When the position of the tile would be fixed, holes could be formed between the tile and the buckled and twisted metal members. This would severely reduce the fire resistancy of the ceiling.

[0028] The invention also relates to a suspended ceiling comprising:

- a plurality of metal members, which are suspended from the ceiling and which members provide a grid;
- a plurality of tiles arranged between the metal members, wherein at least one of the tiles is a tile according to the invention.

[0029] These and other features of the invention will be elucidated in conjunction with the accompanying drawings.

Figure 1 shows a perspective view of a suspended ceiling with a tile according to the invention.
Figure 2 shows a cross sectional view along the line II-II of figure 1.
Figure 3 shows a detail of figure 1 at enlarged scal.

[0030] Figure 1 shows a suspended ceiling 1. This ceiling 1 has a number of metal members 2 having a T-shaped cross section. The metal members 2 are suspended from a ceiling by rods 3. The metal members 2 are positioned parallel and perpendicular to each other, such that a grid is created. In each cell of the grid a tile 4, 5 can be arranged. The tile 4 is a conventional tile of heat resistant material, while tile 5 is a tile according to the invention.

[0031] The tile 5 according to the invention has metal plate 6 with a U-shaped cross section. (see also figures 2 and 3). This metal plate 6 is on the outside padded with a fire resistant layer 7. The U-shaped metal plate 6 forms the first edge 8 and second edge 9 of the tile 5.

[0032] The U-shape of the metal plate 6 provides a space 10, which is further bordered by restriction elements 11, 12. These restriction elements 11, 12 ensure that the metal plate 6 keeps its U-shaped cross section and does deform minimally when heated by a fire. Within the space 10, fluorescent lighting 13 is arranged.

[0033] Figure 2 shows a cross sectional view, in which the restriction element 11 is shown in more detail. The restriction element 11 has two parallel strips 14, 15 which are substantially thicker than the metal plate 6. A layer of fire resistant material 16 is arranged between the strips 14, 15 to provide a sandwich structure. The fire resistant material 16 furthermore provides the necessary fire resistance for the sides of the space 10.

[0034] The restriction element 11 provides a tape 17 of heat foamable material on the side. As soon as the tile 5 is subjected to the heat of a fire, the tape 17 will expand and close the gap between the tile 5 and the metal member 2. This increases the fire resistancy of the tile 5.

[0035] As shown in figure 3, the metal plate 6 runs in this direction up to the web of the T-shaped profile 2, such that the metal member 2 can optimally support the tile 5. In addition a separate cable or rod could be connected to the tile 5 and the ceiling above, to relieve the suspended ceiling system of the weight of the tile 5.

Claims

1. Tile for a ceiling suspension system, the tile having a substantially rectangular shape and comprising:

   - a metal plate extending from a first edge of the tile to the opposite second edge of the tile, wherein the metal plate has at least one cavity; and
   - a fire resistant layer arranged on the metal plate on the outside of the cavity.

2. Tile according to claim 1, wherein the metal plate is spaced apart from the third and fourth edge of the tile.

3. Tile according to claim 1 or 2, wherein the metal plate has a U-shaped cross section to provide the cavity.

4. Tile according to any of the preceding claims, further comprising restriction elements extending between the first and second edge for restricting the expansion of the metal plate.

5. Tile according to claim 4, wherein the restriction elements are strips having a thickness substantially larger than the thickness of the metal plate.

6. Tile according to claim 5, wherein the thickness of the strips is at least twice the thickness of the metal plate.

7. Tile according to any of the claims 4-6, wherein each restriction element comprises two spaced apart, parallel strips with a fire resistant layer interposed in between.

8. Tile according to any of the claims 4-7, wherein the edges of the metal plate are connected to the restriction elements and wherein the restriction elements border the cavity.

9. Tile according to any of the preceding claims, wherein the metal plate is provided with weakened zones.

10. Tile according to any of the preceding claims, wherein lights, preferably fluorescent lighting, are arranged in the cavity.

11. Tile according to any of the preceding claims, wherein a heat foamable tape is arranged on the edges of the tile.

12. Tile according to any of the preceding claims, the tile further comprising a single suspension element for suspending the tile to a ceiling.

13. Tile according to claim 12, wherein the suspension element is a flexible cable, like a steel cable.

14. Suspended ceiling comprising:

   - a plurality of metal members, which are suspended from the ceiling and which members provide a grid;
   - a plurality of tiles arranged between the metal members, wherein at least one of the tiles is a tile according to any of the preceding claims.

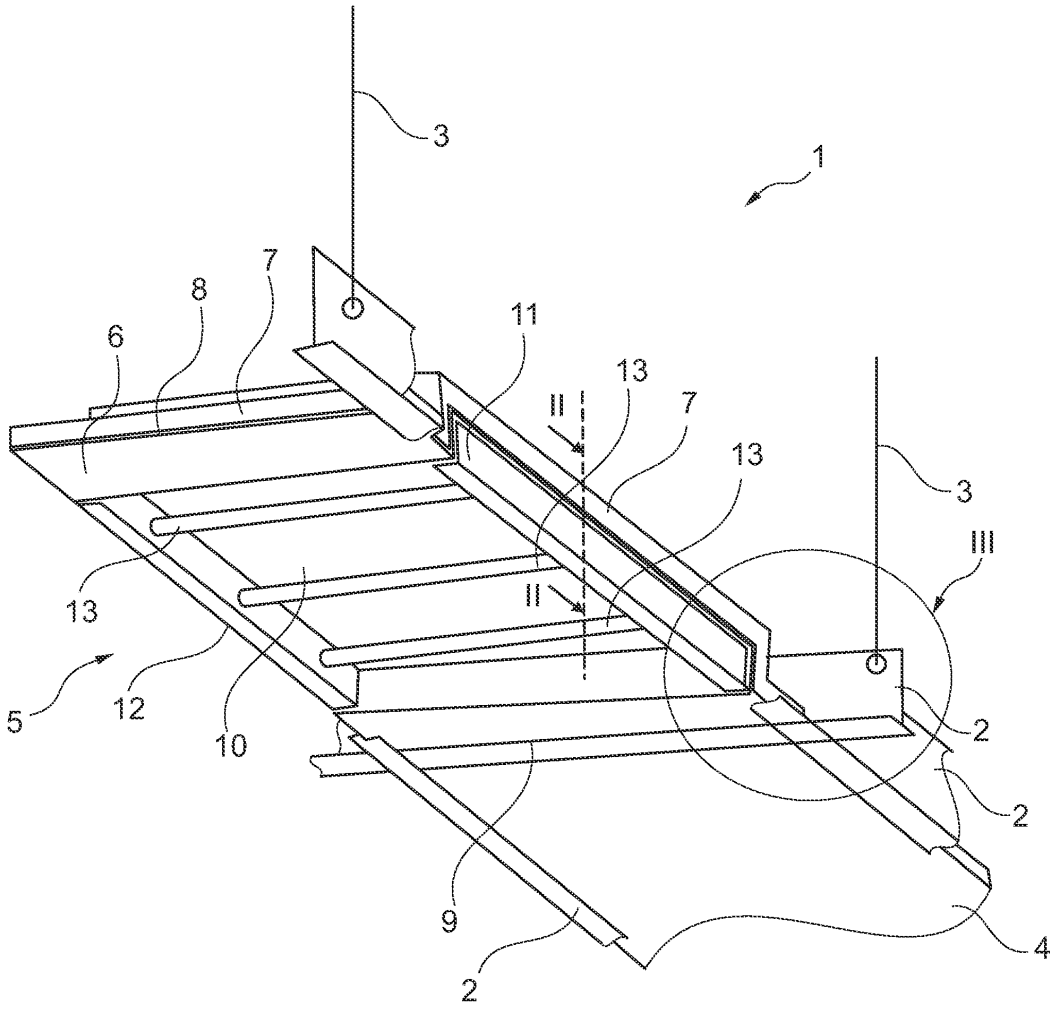

Fig. 1

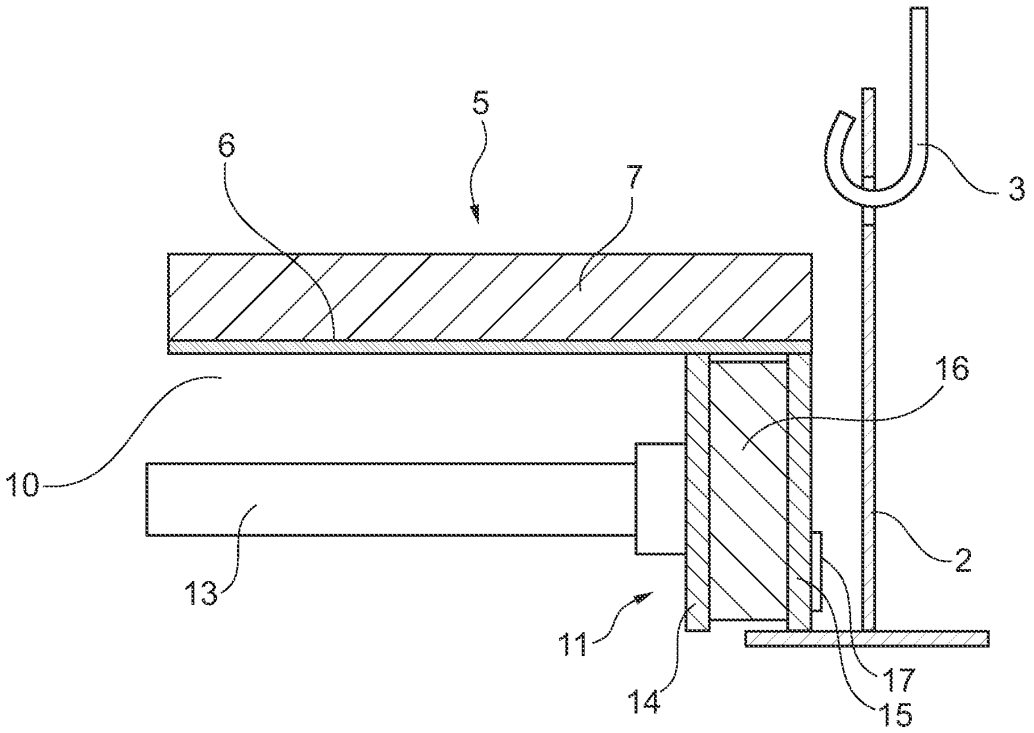

Fig. 2

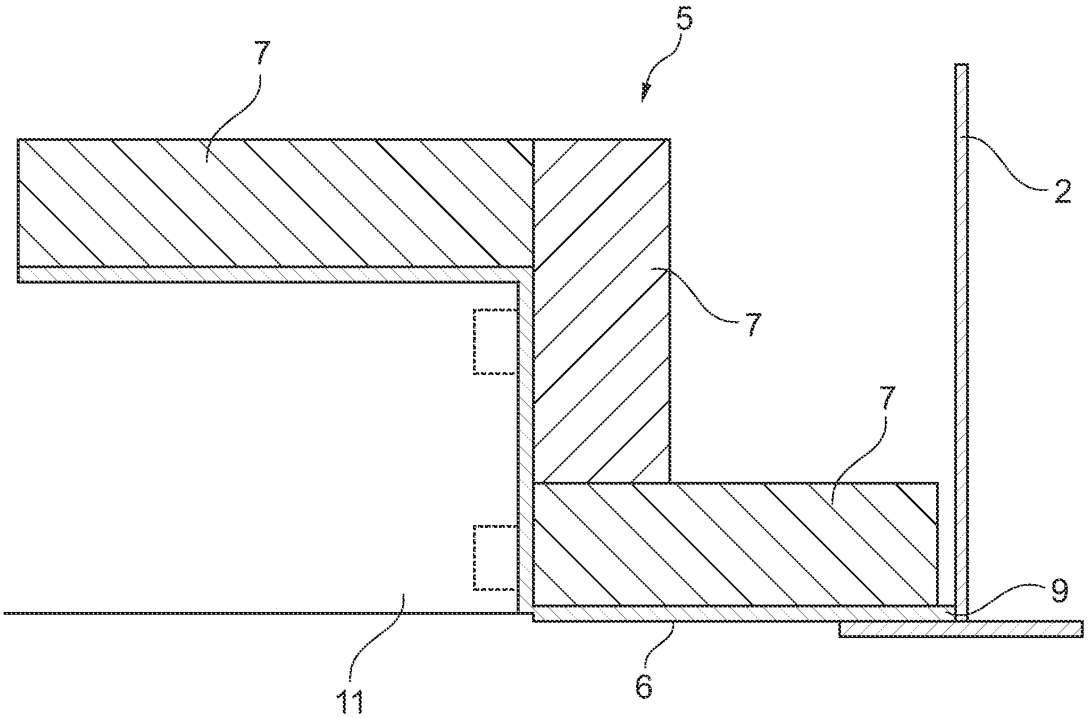

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 7228

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	US 4 210 070 A (DAYUS BARRY R [CA] ET AL) 1 July 1980 (1980-07-01) * figures 1, 2 *	1-6, 8-10,14	INV. E04B9/04 F21S8/02
A	US 2 879 380 A (SPINETTA ANTHONY E) 24 March 1959 (1959-03-24) * figures 1-4 *	4-6,8,10	
X	DE 298 19 624 U1 (LINDNER AG [DE]) 28 January 1999 (1999-01-28)	1-3,5, 10,14	
Y	* figures 4, 5 *	12,13	
Y	DE 36 00 915 A1 (METRO SB HANDELS AG BAAR [CH]) 16 July 1987 (1987-07-16) * figure 2 *	12,13	
X	DE 299 08 680 U1 (LINDNER AG [DE]) 5 August 1999 (1999-08-05)	1-3	
Y	* figure 4 *	11	
Y	DE 36 17 891 A1 (LINDNER AKUSTIKBAU [DE]) 3 December 1987 (1987-12-03) * figure 4 *	11	TECHNICAL FIELDS SEARCHED (IPC) E04B F21S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 November 2011	Demeester, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 16 7228

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02-11-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4210070 A	01-07-1980	CA 1098276 A1	31-03-1981
US 2879380 A	24-03-1959	NONE	
DE 29819624 U1	28-01-1999	NONE	
DE 3600915 A1	16-07-1987	NONE	
DE 29908680 U1	05-08-1999	NONE	
DE 3617891 A1	03-12-1987	DE 3645355 C2	30-09-1999

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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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Patent documents cited in the description

- EP 1564339 A **[0005]**