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

(11) EP 2 236 915 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.10.2010 Bulletin 2010/40

(51) Int Cl.:
F21V 15/01 *(2006.01)* ***F21S 8/02*** *(2006.01)*
F21V 11/02 *(2006.01)*

(21) Application number: **09156949.1**

(22) Date of filing: **31.03.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(60) Divisional application:
10158158.5

(71) Applicant: **Flowil International Lighting (HOLDING) B.V.**
1097 JB Amsterdam (NL)

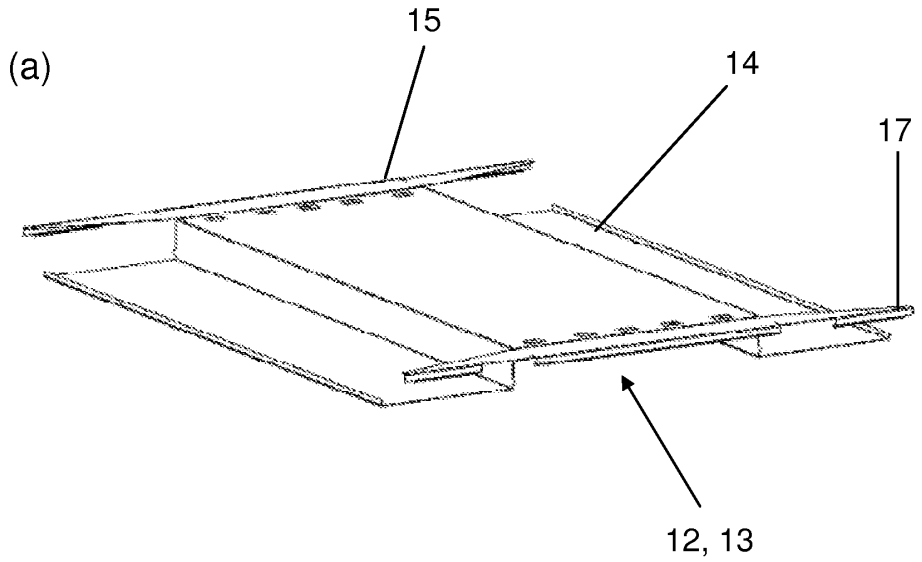
(72) Inventors:
- **Dubien, Laurent**
  42340 Veauche (FR)
- **Dousson, Aurélien**
  42580 L'étrat (FR)

(74) Representative: **Zech, Stefan Markus et al**
Meissner, Bolte & Partner GbR
Postfach 86 06 24
81633 München (DE)

(54) Ceiling Light Housing and Lighting Lamellae

(57) The present application relates to a light housing (10) for fitment within a suspended ceiling (1), wherein the light housing (10) comprises a generally flat front surface (11) for fitting flush with the lower side of the suspended ceiling (1). A recessed portion (12) is provided within the front surface (11) for housing a lighting fitment (2), the recessed portion (12) being structured as a recessed box (13) open at the face coinciding with the plane of the front surface (11) and closed on the remaining five sides. The entire light housing (10) is made from a single cut, formed and folded material sheet, preferably one of a metallic or plastic material.

Figure 2



EP 2 236 915 A1

Description

Background to the Invention

[0001] Many offices are provided with a suspended ceiling which is positioned a certain distance from the actual ceiling of the building. This is for both cosmetic as well as technical reasons. Providing a space between the concrete or wooden ceiling of a building and a suspended ceiling therefrom, allows for hiding the large number of electrical and telecommunication cables common in modern offices. Additionally, suspended ceilings are useful for such aspects as thermal and sound insulation between floors.

[0002] It is not uncommon to have a suspended ceiling comprising a plurality of ceiling tiles which are suspended on a grid of supports. This grid has a certain pitch, typically square although of course rectangular is also possible, into which the ceiling tiles are located. For example, it is common to have a suspended ceiling in which the crossed supports have a pitch of approximately 600mm in both directions, thus requiring ceiling tiles with a size of approximately 600mm per side. It is further common for the gap between the actual ceiling and the suspended ceiling to be approximately 150mm. This gap allows for sufficient space in fitting the ceiling tiles and the like, as well for housing any other items to be held in the space.

[0003] In such suspended ceilings, the replacement of one of the ceiling tiles by a lighting tile is well known. Such lighting tiles typically have the same dimensional size as the ceiling tiles, but further incorporate a number of lighting elements. A common design for such lighting tiles incorporates fluorescent tubes within the lighting tile, these fluorescent tubes being held within louvers to improve the spread of light into the room.

[0004] With the invention of new smaller fluorescent tubes, there is a demand for reduced sizes of louvers and lighting tiles. Clearly, with the new narrow diameter fluorescent tubes, the requirement of the thickness of the lighting tile can be relaxed, and indeed with such narrow fluorescent tubes the lighting tile can be made substantially thinner. This has a further advantage that the gap between the suspended ceiling and the real ceiling could be reduced, as the requirement of depth between these two ceilings to allow the incorporation of the lighting tile is relaxed by provision of a narrower lighting tile.

[0005] Typical lighting tiles are formed with an appropriate recess in which to house the louver and fluorescent tube. With the new smaller diameter fluorescent tubes, it is not appropriate to simply scale the size of the louver in a vertical dimension in order to lead to a narrower ceiling tile, as the lighting lamellae present in the louver will cease to be efficient after such scaling. Further, it is desirable to develop a simpler lighting tile with an improved method of fabrication, which is particularly suited for the smaller and lighter louvers useful for the narrow fluorescent tubes.

Summary of the Invention

[0006] The present application has been developed to address the above problem. In particular, the disclosure relates to the provision of a simple lighting tile suitable for housing a louver and small diameter fluorescent tube. Another aspect of the present disclosure relates to a design for a lighting lamellae to be incorporated into a louver, in particular a louver for the abovementioned lighting tile, although the lighting lamellae is obviously suitable for incorporation into any louver in any light housing.

[0007] The present disclosure provides a light housing in accordance with independent claim 1, and a method for making the same in accordance with independent claim 6. Further disclosed is a lighting lamellae according to independent claim 9. Further preferred embodiments are given in the dependent claims.

[0008] The claimed invention can be better understood in view of the embodiments of the light housing and lighting lamellae described hereinafter. In general, the described embodiments describe preferred embodiments of the invention. The attentive reader will note, however, that some aspects of the described embodiments extend beyond the scope of the claims. To the respect that the described embodiments indeed extend beyond the scope of the claims, the described embodiments are to be considered supplementary background information and do not constitute definitions of the invention *per se.* This also holds for the subsequent "Brief Description of the Drawings" as well as the "Detailed Description of the Preferred Embodiments."

[0009] In particular, the present disclosure relates to a light housing which is intended for fitment within a suspended ceiling. The light housing is advantageously shaped such that it would replace the ceiling tile present in the suspended ceiling, and thus sit flush within the exposed lower surface of the suspended ceiling. In particular, the light housing may comprise a front surface, which is generally flat and will be exposed as the visible side of the suspended ceiling. This flat front surface will preferably be in the same plane as the lower surface of the suspended ceiling. Within the light housing, a recessed portion is provided which will extend back from the plane of the flat front surface. This recessed portion is sized and shaped accordingly, such that it could house a louver or lighting fitment therein. In particular, the recessed portion may be structured as a recessed box extending behind the plane of the front surface, with the open side of the box coinciding with the plane of the front surface. This recessed box would then be closed on the remaining

five sides. In particular, this light housing would be produced from a single sheet of metal, which is punched out to provide a certain outline, and then bent in order to provide the recessed portion with the five closed sides and an overall footprint the same size as the ceiling tile which it will replace.

[0010] Preferably, the light housing will have either a square or rectangular shape, wherein the recessed portion extends between two parallel edges of the light housing. This recessed portion will then provide either a square or rectangular shaped recessed box. In order to form the recessed portion, the metallic sheet is bent to form two steps, one extending behind the plane of the flat front surface, and the second extending back into this front surface plane. In between the two steps is provided a back surface, which is advantageously parallel with the front flat surface. The steps can either be at right angles, or at any other sloped angle, as long as the same metallic sheet is bent and traverses between the first section of front face to the back surface, and then back to the second section of the front face. The step portions will make two of the sidewalls of the recessed box, and will further define the width of the recessed portion. The remaining two sides of the recessed portion may be provided by side wings which extend outward from the back surface of the recessed portion. These side wings are formed integrally with the sheet of metal forming the light housing, and consequently the back surface. The side wings extend generally perpendicular to the plane of the back portion and form the remaining sidewalls of the recessed portion, by bridging the gap formed between the recess and the flat front surface along the side of the light housing.

[0011] It is further possible to provide the side wings with a width wider than the back portion of the recessed portion. By providing these wider than the width of the recessed portion, they can be provided with attachment flaps at the lower ends thereof. Such attachment flaps could then provide a fixing means for attaching the side wings to the back surface of the flat front surface, so as to improve the strength and rigidity of the light housing. Additionally, if flaps are provided in a location coinciding with the recessed portion, these flaps can be used to subsequently hold a lighting fitment or louver.

[0012] It is possible to provide the side wings with a trapezoidal shape, wherein the short parallel side is defined as being the width of the back surface of the recessed portion. The long side of the trapezoidal shape can further advantageously be the same length as the sideline of the light housing, such that the side wings extend from the recessed portion all the way out to the side portions of the light housing. By extending all the way out, it is possible to attach the flaps, if present, to the entire side of the flat front surface, which will further improve the strength and rigidity of the light housing.

[0013] An additional advantage of providing the trapezoidal shape to the side wings, relates to the housing of the light panel or housing within a suspended ceiling. As has been discussed above, by using very narrow diameter fluorescent tubes, the overall thickness of the light housing tile can be reduced. This also allows for the gap between the suspended ceiling and the real ceiling to be reduced, which clearly leads to a restriction in fitting the lighting tile or housing within the suspended ceiling. By providing the trapezoidal side wings, it is possible to slide the lighting tile into a gap in the suspended ceiling, and not strike the concrete ceiling there-above when the gap between the suspended and real ceiling is reduced. Indeed, it is possible to reduce the gap between the suspended and real ceiling to 100 mm, rather than a more 150 mm. This is a direct advantage of the provision of the trapezoidal side wings.

The overall depth of the lighting or tile is determined by the depth of the recessed portion. This recessed portion can have a depth which lies between 30 and 50mm, preferably between about 35mm and 45mm, most preferably about 40mm.

[0014] According to the present disclosure, a method of forming the above light housing begins with providing a single metallic sheet. This metallic sheet is then stamped into the appropriate shape to allow a lighting housing to be fabricated by means of bending the metallic sheet only. In particular, the flat sheet is cut such that a central portion is provided with either; a square or rectangular shape, and further the side wings are provided extending out and away from two of the parallel sides to this central portion.

[0015] Once the metallic sheet has been stamped into the appropriate shape, the central portion may be bent to provide four bends along a chosen direction of the central portion. These four bends are approximately parallel with each other and provide two opposing steps. The first step extends within and below the upper plane of the central portion, and the second step extends upward again to return the remaining section of the central portion to the same plane as the first section. Further, side wings may be provided integral with the back surface of the recessed portion formed by the two steps. These are bent forward to close off the two open sidewalls of the recessed portion, in order to form a recessed box in the light housing.

[0016] It is possible to form the side wings with a width which is larger than the width of the eventual recessed portion in the light housing, such that if flaps are further provided at the edges of the side wings, these can be attached to the rear side of the front surface formed by the central portion of the metallic sheet. Preferably, this can be performed by spot welding.

[0017] If the side wings are provided with a trapezoidal shape, during the bending they can extend along the side of the front surface of the light housing. This is as described above with regard to the actual light housing.

[0018] A further aspect of the present disclosure relates to a lighting lamellae, which is particularly advantageous for use with fluorescent tubes. In particular, with narrow diameter fluorescent tubes it is possible to provide light housings and louvers which have a much reduced thickness, thus leading to more compact lighting equipment. The lighting

lamellae of the present disclosure, are provided by a sheet which is bent into a generally V-shaped cross-sectional structure. Obviously, two sheets could be used to form the sidewalls of the V, and these are then attached at the vertex at the bottom of the V. A bottom portion which extends longitudinally is provided as the vertex of the V, thus giving the lighting lamellae a three-dimensional shape of a folded reflective sheet with a V-shaped cross-section. Preferably, the bottom portion is provided by a linear straight line which extends the full length of the lighting lamellae.

[0019] Preferably, the side sheets extend from this straight bottom portion upwards to the upper edges which form the tops of the V of the lighting lamellae. Rather than progressing from the bottom portion to the top end portions in a linear manner, it is preferable for these side sheets to extend in a curved manner, thus giving the V-shaped profile an outwardly curving shape from the vertex to the upper edges. Additionally, the upper edges extend along the length of the lighting lamellae in the same general direction as the linear bottom portion. The upper edges from the two outer sides of the lighting lamellae, do not follow a straight line, rather they have a curved profile as one progresses along the longitudinal direction of the lighting lamellae from one side to the other. It is preferable for the distance between these two upper edges to be greater at the centre of the lighting lamellae, and closer at either side thereof.

[0020] This structure gives a three-dimensional curved surface to the lighting lamellae, which varies not only in the vertical direction from vertex to upper edge, but also in the longitudinal direction from each of the outer sides. Further, it is particularly advantageous to have the bottom portion defined as a straight line linear edge.

[0021] The lighting lamellae may also have a varying distance between the upper edges and the bottom portion. In particular, as one extends from one outer side along the length direction of the lighting lamellae to the other outer side, the distance between the upper edge and the bottom portion is reduced towards the centre of the lighting lamellae. By forming this reduced height to the lighting lamellae in the centre, it is possible position the lighting lamellae such that the fluorescent tube lies in this reduced height portion.

[0022] It is possible for the variation in the height of the lighting lamellae from one side to the next following a longitudinal direction, to change in either a linear or non-linear manner. One option is to provide two straight lines progressing from the outer edge to the centre of the lighting lamellae, so as to provide a further V-shaped profile. Also, it is quite possible to provide the upper edge varying in a convex or concave curve between the outer sides and the centre.

[0023] It is further possible to provide the outwardly curving sidewalls given by the two side sheets with a constantly varying radius of curvature. Rather than providing the variation in the vertical direction between the lower portion and the upper edges by means of a single curve, it is desirable to change the radius of curvature from a larger radius to a smaller radius as one progresses from the bottom to the top of the lighting lamellae. It is further preferable for the distance between the two top edges to have a curved profile which also changes, and is not possessed of a single radius of curvature.

[0024] In the alternative, it is possible to provide the lighting lamellae with outwardly curving side walls formed by the two side sheets which have a lower portion, in which the separation distance between the two side sheets varies in a linear manner when moving from the vertex toward the two upper edges. Furthermore, in this lower portion the separation between the two side sheets does not alter along the length direction of the lighting lamellae. This lower portion may then lead into an intermediate and upper portions, in which the separation width between the two side sheets varies in a non-linear manner, when moving from the top of lower portion to the two upper edges. This non-linear variation preferably proceeds with a constantly varying radius of curvature. Further, within the intermediate portion the separation distance between the two side sheets does not alter along the length direction of the lighting lamellae.

[0025] In this design, the variation in the separation distance between the top upper edges may have a constantly varying radius of curvature from the outer sides to the centre. In particular, this variation between the separation distance between the two side sheets progresses from the top upper edges within the upper portion only, and no further, so as to reach the top edge of the intermediate portion. As discussed above, the separation distance between the two side sheets within the upper portion varies from wider at the centre of the lighting lamellae, to narrower at either ends of the lighting lamellae.

[0026] Within this lighting lamellae, the lower portion may extend for between 40% and 60% of the total vertical height of the lighting lamellae. More preferably, this lower portion may extend for between 45% and 55% of the vertical height of the lighting lamellae. Most preferably, this lower portion extends for about 50% of the vertical height of the lighting lamellae. Additionally, the upper portion may extends from a point which lies between 60% and 80% up the vertical direction of the lighting lamellae to the top edge of the lighting lamellae. More preferably, this can extend from a point between 65% and 75% up the vertical direction of the lighting lamellae. Most preferably, the upper portion extends from a point about 70% up the vertical direction of the lighting lamellae. In this situation, the intermediate portion appropriately bridges the gap left between the lower and the upper portions.

[0027] It is further advantageous to provide the two top upper edges of the lighting lamellae with a further surface extending there-between. This would then form a closed top V-shaped cross-sectional profile. This top surface can either be flat between the two upper edges of the sidewalls; or it may extend higher than the height of the two top edges, so as to create a more diamond like cross-sectional profile; or finally the top surface could be recessed and moved downward generally toward the lower portion, so as to create a arrowhead like cross-section.

Brief Description of the Figures

[0028]

Figure 1: Perspective and cross-sectional view of the light housing as well as a suspended ceiling.
Figure 2: Perspective views showing the fabrication of the light housing.
Figure 3: Three perspective views showing aspects of the lighting lamellae.
Figure 4: Graph showing variation of side sheet of lighting lamellae.

Detailed Description

[0029] Figures 1a and 1b show a light housing 10 according to the present disclosure. In particular, Figure 1a shows a perspective view from the lower visible side of the light housing 10, and Figure 1b shows a cross-section of the light housing 10 held within the suspended ceiling 1. As has been discussed above, light housings 10 of this general design are well known in the art. As can be seen from Figure 1b, the light housing 10 is designed to be located within a suspended ceiling 1, which is located below the concrete or wood ceiling 3 of the original building.

[0030] As can be seen from Figure 1a, the light housing 10 is generally provided with either a light filament 2 or a light fitting 4. Such a source of light is, in the present disclosure, intended to encompass a fluorescent tube in a louver arrangement. In Figure 1, two such louvers can be seen, with each being provided with two fluorescent tubes. Obviously, a light housing 10 may be provided with any number of light fitments 2 and indeed the provision of two louvers and four fluorescent tubes is clearly by way of example only. As is also well know for light housings 10 of this kind, they are structured to be positioned within the suspended ceiling 1, preferably taking over the place of one or more ceiling tiles of the suspended ceiling 1.

[0031] As can be seen in Figure 1b, the light housing 10 will, in a preferred design, fit plush with the lower surface of the suspended ceiling 1, with the flat front surface 11 of the light housing 10 generally aligning with the suspended ceiling 1. This light housing 10 is provided with an appropriate recessed portion 12, in which the light fitting 4 can be located.

[0032] Turning to Figure 2a, a partially constructed version of the light housing 10 is shown. The central region providing a recessed portion 12 is structured and sized so as to house the light fittings 4 appropriate to the light housing 10. As can also be seen in this figure, the light housing 10 of the present disclosure is advantageously fabricated from a single sheet of material. This material can be any appropriate rigid material, such as a metallic sheet 14 or a strong plastic material. In particular, the light housing 10 of the present disclosure is entirely fabricated from a single such sheet, and no additional material is added or attached to this single sheet in the production of the light housing 10.

[0033] The light housing 10 of the present disclosure is completely structured from this single sheet of material, and is in fact formed into the light housing 10 by means of simply bending and folding the material. Obviously, metallic sheets 14 are advantageous in this aspect, as metal will readily fold without fracturing, and will generally maintain the folded shape after removal of pressure. Of course, plastic materials can also be selectively heated to lead to regions which are readily foldable, and thus a single plastic sheet can be structured into the light housing 10.

[0034] The first step in producing the light housing 10, is to appropriately punch out or cut out or preform the material sheet into an appropriate outline. In this respect, the production of the light housing 10 could be likened to the production of a cardboard box. In the sense of a cardboard box, the necessary shape is cut out of the cardboard, and the box is folded and attached together to create the box. In an analogous manner, the light housing 10 of the present disclosure is also formed in this way. The outline of the precursor to the light housing 10 is selected such that with certain folds, the flat sheet can be turned into the three-dimensional light housing 10 as shown in Figures 1 and 2.

[0035] As can be seen in Figure 2a, the intermediate step in production of the light housing 10 is the provision of two steps within the central portion of the material sheet. These two steps are generally provided in opposition, the first step leading to the material being positioned behind the flat front surface 11, so as to create the back surface 16. The second opposing step returns the plane of the material sheet back to the same as the front surface 11, to create a generally planar flat front surface 11 of the light housing 10. By providing these two opposed steps in the material sheet, a recessed portion 12 is defined. This recessed portion 12 is sized and shaped so as to appropriately house the light fittings 4 of the light housing 10.

[0036] It is generally preferable for the recessed portion 12 to extend from one side of the material sheet to the other side of the material sheet, to create either a square or rectangular recessed portion 12. Typically, the light fittings 4 to be used with the light housing 10 will be square or rectangular in nature, thus necessitating the square or rectangular recessed portion 12. Structuring the recessed portion 12 in this way, allows for the provision of side wings 15 in order to complete the recessed portion 12 and create an open recessed box 13. As can be seen in Figure 2a, the side wings 15 are originally formed as part of the flat material sheet which is cut or stamped to the appropriate precursor shape. That is, these side wings 15 are also part of the original material sheet, and do not need to be attached to the light housing 10 after bending to form the recessed portion 12. Obviously, this pre-forming of the side wings 15, leads to a

great reduction in the overheads for fabricating the light housings 10, as only the steps of cutting and bending need to be performed. Whilst this is the preferred form, it is also possible to provide the side wings 15 separate from the original material sheet, and attachable thereto.

[0037] As is seen in Figures 2a and 2b, once the recessed portion 12 has been partially formed by provision of the two opposing steps in the central region, the side wings 15 can be bent round in order to close in the open two sides of the recessed portion 12. After bending of the side wings 15, the light housing 10 is provided with the recessed box 13, which is of the appropriate size and shape for housing the desired light fittings 4. In this design, it is quite clear that the recessed box 13 is provided by the back surface 16, the two sidewalls formed by the steps, as well the sidewalls formed by the bent over side wings 15. It is not necessary to provide the steps at exactly 90°, as shown in Figures 2a and 2b, and indeed the steps can in fact be sloped sections between the material making up the flat front surface 11 and the back surface 16. It is desirable only that the back surface 16 and the flat front surfaces 11 be parallel with each other, so as to reduce the overall depth of the light housing 10.

[0038] One further aspect which can be seen in Figures 1 and 2, is that the side wings 15 can be provided with a rhomboid shape. In this case, it is advantageous for the short parallel side of the rhombus making up the side wings 15 to be integral with the back surface 16, and indeed to be the same length as the back surface 16. By providing the back surface 16 and the short side 18 of the side wings 15 with the same length, this will ensure that the recessed box 13 is completely closed-in after bending of the side wings 15. It is then possible to define the long side 19 of the rhombus shape making up the side wings 15 with the same length as the overall length of the light housing 10. As will be seen below, this can then be used to improve the rigidity of the light housing 10.

[0039] Shown best in Figure 2a, it is possible to provide the side wings 15 with attachment flaps 17. These attachment flaps 17 can be provided by additional bent sections of the side wings 15, and are thus also provided as integral parts from the original material sheet. After bending of the side wings 15, the flaps 17 will overlap with the rear side of the flat front surface 11. Such flaps 17 can then be used for attachment of the side wing 15 to the flat front surface 11, which will lead to an improvement in the rigidity of the light housing 10. This attachment may be by welding (preferably spot welding), or gluing. This simple mechanism for structuring the light housing 10 improves not only on the manufacturing overheads, but also reduces waste material. Finally, with the provision of the flaps 17, the final light housing 10 is rigid enough to be held within the appropriate hole in the suspended ceiling 1.

[0040] It is also possible to provide flaps 17 on the central sections of the long side 19 of the rhombus making up the side wings 15. By providing these additional flaps 17, it is possible to readily hold the light fitting 4 within the recessed box 13. This will then mean that the light housing 10 need not be structured such that the light fitting 4 must be fully attached to the light housing 10. The flaps 17 can be used to hold the light fitting 4 removably in place, thus improving the use of the light housing 10.

[0041] It is possible to structure the light housing 10 with a generally reduced thickness, primarily as this is intended to be used with the narrow fluorescent tubing. Typical light housings 10 of the art, have a thickness in the region of 45 mm. The light housing 10 of the present disclosure, may be provided with a thickness of 40 mm. This is primarily as a result of the use of the narrow diameter fluorescent tubes. As these fluorescent tubes have a reduced diameter leading to the reduced thickness of the light housing 10, it is possible to utilise a gap between the suspended ceiling 1 and the concrete ceiling 3 which is much narrower than that currently used. At present, it is typical for the suspended ceiling 1 to be approximately 150 mm away from the concrete or wooden ceiling 3. By utilising the narrower diameter fluorescent tubes, it is possible to reduce the size of this gap to as little as 100 mm. This clearly has advantages in buildings, as it allows for a higher suspended ceiling 1.

[0042] If the light housing 10 is to be used in a suspended ceiling 1 arrangement which is only 100 mm from the concrete ceiling 3, the provision of the rhombus shaped side wings 15 is advantageous. It is clear that the light housing 10 must be positioned within a hole in the suspended ceiling 1. Typically, this is achieved after the suspended ceiling 1 is in place, at when any maintenance needs to be undertaken to the light housing 10, the light housing 10 must be removable from the suspended ceiling 1. Providing the side wings 15 with the rhombus outline, allows the light housing 10 to be slid within the gap in the suspended ceiling 1, with the suspended ceiling 1 being only 100 mm from the concrete ceiling 3. Obviously, the angled side to the side wings 15 will allow the light housing to be angled within the gap in the suspended ceiling 1, without striking the concrete ceiling. That is, the rhombus shaped side wings 15 are particularly useful for allowing the light housing 10 to be fitting within a reduced gap suspended ceiling 1.

Within louvers for lights, in particular fluorescent tube lights, it is common to provide lighting lamellae 30 in order to improve the spread of light from the fluorescent tube around the room. Such lighting lamellae 30 are generally provided by curved reflective strips of material, possibly polished metal, mirrored glass or mirrored plastic. Such lighting lamellae 30 are to be positioned within a louver, and are generally positioned near to the fluorescent tube in order to improve the reliability of reflecting the light into the room in the appropriate manner.

[0043] The lighting lamellae 30 as shown in Figure 3 and 4, is of particular use with the narrow diameter fluorescent tubes intended for use in the light housing 10 described above. The lighting lamellae 30 as to be described below are, of course, not limited to being used with this light housing 10. Indeed, it is possible for the lighting lamellae 30 to be

utilised within any appropriate louver or light arrangement.

[0044] Lighting lamellae 30 are generally known in the art, and are particularly known for use with standard fluorescent tube lighting. With the new narrow diameter fluorescent tubing, it is possible to provide much narrower light fittings 4, as the fluorescent tube is of a much smaller size. Additionally, the diameter of the narrow diameter fluorescent tubing leads to a change in the distribution of the light from the fluorescent tube, when compared with the standard fluorescent tubes common in the art. As such, in producing efficient lighting lamellae 30 for use with such narrow diameter fluorescent tubing, it is not simply appropriate to scale the known lighting lamellae to coincide with the size of the narrow diameter lighting tubes. One further aspect, is that lighting lamellae 30 for the narrow diameter fluorescent tubing is advantageously reduced in its vertical dimension, so as to also improve the overall depth of the resulting light. In other words, it is advantageous to reduce the thickness of the entire light as well known in the art, and this can be achieved by means of the lighting lamellae 30.

[0045] Figure 3 shows three perspective views of the lighting lamellae 30 according to the present disclosure. This lighting lamellae 30 is advantageously provided with three distinct regions or portions. Further, the lighting lamellae 30 is structured with a cross-section very similar to a V, each side of the V being provided by side sheets 32 of the lighting lamellae 30. These side sheets 32 meet at a bottom portion 31, which is the lowest longitudinal section providing the vertex 33 of the V-shaped lighting lamellae 30. This vertex 33 extends along the length of the lighting lamellae 30, and provides a linear straight line 34 to the bottom portion 31. This can best be seen in the upper drawings of Figure 3. As can be seen from Figure 3, the profile of the side sheets 32 is non-linear in both the vertical and longitudinal direction. That is, as the side sheets 32 progress from the vertex 33 to the upper edges 35 forming the top points of the V cross-section, the side sheets 32 do not progress in a straight line. Rather, the side sheets 32 are somewhat curved as they move in the upward direction, assuming the bottom portion 31 to be the lowest and down-most point.

[0046] As can further be determined from at least Figure 3, the side sheets 32 also curve when moving along the longitudinal direction of the lighting lamellae. This is particularly so around the upper edges 35, and indeed the higher section of the lighting lamellae. The lighting lamellae 30 of the present disclosure is therefore specifically characterised by this fully three-dimensional curving of the side sheets 32, which leads to a greatly improved reflection of the light from the narrow diameter fluorescent tubes when compared with a normal lighting lamellae 30, or a normal lighting lamellae 30 which has been simply reduced in size.

[0047] Particularly advantageous is for the lighting lamellae 30 to have curved side sheets 32 with a varying radius of curvature. It is possible to provide the side sheets 32 with a varying radius of curvature in the vertical direction, such that the side sheets 32 move away from each other more and more as one progresses in the vertical direction. Additionally, the longitudinal variation in the distance between the two side sheets 32 can vary in a non-linear manner. Further, this non-linear variation can also proceed by means of curves with changing radii of curvature. It is advantageous if the upper edges 35 of the lighting lamellae 30 are not formed parallel with each other, rather the gap there-between varies as one moves in the longitudinal direction. Again, this can proceed in a non-linear manner, and preferably can proceed with a curve in which the radius of curvature changes as one moves along the longitudinal direction. It is particularly advantageous if the distance between the upper edges 35 of the lighting lamellae 30 are provided with a minimum gap there-between at the outer sides 36, this gap increasing as one moves toward the centre 37 of the lighting lamellae 30. After passing the centre 37 in the longitudinal direction, the gap between the two upper edges 35 reduces again to its minimum at the second outer side 36.

[0048] A further particularly advantageous design of the lighting lamellae 30, can be determined from Figures 3 and 4. In particular, the lighting lamellae of these figures is provided with three distinct portions. The lower portion 40 extends from the vertex 33 toward the upper edges 35. An upper portion 42 extends from the upper edges 35 downward towards the vertex 33. These two portions preferably do not meet each other toward in the middle of the lighting lamellae, rather they each join opposing sides of an intermediate portion 41 located there-between. The properties of each of these portions 40, 41, 42 are distinct from each other, and lead to the overall preferable design of the lighting lamellae 30.

[0049] In the lower portion 40, the side sheets 32 are provided with a linear structure. This linear structure, in particular, is manifest in the way the gap between the two side sheets 32 changes as one progresses in the vertical direction from the vertex 33. As can be seen in Figure 4, the lower portion 40 has a gap between the side sheets 32 which increases in a generally linear manner, for a certain percentage of the total height of the lighting lamellae 30. In particular, the lower portion 40 may extend between 40% and 60% of the vertical height of the lighting lamellae 30; more preferably it may extend for between 45% and 55% of the lighting lamellae 30; most preferably, the lower portion 40 may extend for about 50% of the vertical height of the lighting lamellae 30.

[0050] The lower portion 40 is also categorised in that there is no variation in the gap between the side sheets 32, when viewed in the longitudinal direction. That is, the gap between the side sheets 32 for a given vertical height remains constant across the entire length of the lighting lamellae 30, in the longitudinal direction. In other words, the lower portion 40 is characterised with side sheets 32 which are in fact planar in nature, and angled such that they are not parallel with each other.

[0051] Turning to the upper portion 42, this is particularly categorised by a variation in the gap between the two side

sheets 32 in both the vertical and longitudinal directions. That is, as one progresses through the upper portion 42 in the vertical direction, the variation in gap between the two side sheets 32 increases as one moves vertically upward in the direction from the vertex 33 to the upper edges 35. For any given height point up the lighting lamellae 30, if one proceeds along the surface of the side sheets 32 in the longitudinal direction, the gap between the two side sheets 32 also varies in this direction. This is somewhat different from the variation seen in the lower portion 40, wherein the gap stays constant as one moves in the longitudinal direction.

[0052] In particular, the upper portion 42 is provided with a gap between the side sheets 32 which varies from a minimum at the two outer sides 36 of the lighting lamellae 30, and progresses to a maximum at the centre 37 in the longitudinal direction. This increase is defined as for a given point along the vertical height of the lighting lamellae 30. In other words, the upper portion 42 is properly characterised by a fully three-dimensionally curved surface, which changes not only as one progresses in the vertical direction, but also changes as one move in the longitudinal direction. Again, this variation in the gap between the side sheets 32 may occur with a changing radius of curvature from point to the next.

[0053] The upper portion 42 preferably extends from a point which lies between 60% and 80% of the total height of the lighting lamellae 30, obviously taken in the vertical direction. More preferably, the upper portion 42 extends from a point which is between 65% and 75% of the total height of the lighting lamellae 30, and most preferably the upper portion 42 lies at a point 70% up the vertical height of the lighting lamellae 30. The intermediate portion 41 is specifically defined as lying between the two above defined portions, those of the lower 40 and upper 42 portions. The intermediate portion 41 is defined as having a non-linear change in the width of the gap between the two sheets 32 in the vertical direction, but still has a constant gap between these two sheets 32 when progressing in the longitudinal direction and maintaining a fixed height along the lighting lamellae 30. That is, for a given point in the vertical direction within the intermediate portion 41, the gap between the two side sheets 32 does not change along the longitudinal direction. In the vertical direction, however, the variation in gap between the two side sheets 32 changes in a non-linear manner. Further preferably, this non-linear manner is characterised by a curve with a changing radius of curvature.

[0054] Table 1 shows data points characterising the width of the gap between the two side sheets 32 of the lighting lamellae 30. This table expressly links to the data shown in Figure 4, and shows the gap between the two side sheets 32 at a series of points in the X direction, starting at 0 and running to 26, and also in the Y direction again starting at 0 and running to 18. At each point on the grid shown in Figure 4, the value of the gap between the two side sheets 32 is given in millimetres. For example, at a point X 12 and Y 12, the gap between the two side sheets is 2.09 mm. This table clearly shows the variation being described above with regard to the lower 40, intermediate 41 and upper 42 portions. It is to be noted that the data shown in table 1 is purely for example, and is included merely to show a possible variation of the gap between the two side sheets 32 in the lighting lamellae 30. Obviously, the lighting lamellae 30 can have a different overall height and length, and further it may have a different ratio of lower 40 intermediate 41 and upper 42 portions. Additionally, the size of the gap shown in table 1 is also for example only, and indeed the gap could be greater or smaller depending upon the requirements of the design.

Table 1:

Y Datum	0	2	4	6	8	10	12	14	16	18	20	22	24	26
18									3.43	3.36	3.3	3.24		
16		3.38	3.26	3.18	3.11	3.05	3	2.96	2.91	2.87	2.83	2.81	2.78	
14	2.67	2.63	2.59	2.57	2.54	2.52	2.5	2.48	2.47	2.46	2.44	2.43	2.42	
12	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09	2.09
10	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
8	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46
6	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
4	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
2	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

X Datum

Z Coordinates

[0055] Looking at the plot shown to the right hand side of Figure 4, the X 0 point is taken at the centre 37 along the longitudinal direction of the lighting lamellae 30. The lighting lamellae 30 is preferably symmetric around this point, and thus the same structure would be observed for the second half of the lighting lamellae 30 extending from the centre point 37 to the left, as viewed in Figure 4.

[0056] As is also clear from the Figures 3 and 4, the top surface 38 of the lighting lamellae 30 can be closed off to create a closed V-shaped profile. In the figures, this top surface 38 is shown as being generally linear between the upper

edges 35 of the lighting lamellae 30. This is by way of example only, and it is possible for this top surface 38 to also have a peak or trough formation. Indeed, if the top surface 38 were formed with a peak, such that the cross-section of the lighting lamellae 30 had a partially diamond shape, light striking the top surface 38 would generally be reflected outward and away from the centre line 39 running along the longitudinal direction of the lighting lamellae 30. Likewise, it is possible to provide the top surface 38 with a recess or trough design, such that the cross-section of the lighting lamellae 30 is that of an arrowhead. Once again, this will lead to light striking the top surface 38 being reflected at an angle with respect to this incoming light, wherein the angle is not 0°, again leading to improved reflection of the light around the room.

[0057] One final aspect of the lighting lamellae 30 as evident from Figures 3 and 4, is that the height of the lighting lamellae 30 varies in the longitudinal direction. That is, the height of the lighting lamella 30 is preferably greatest at the two outer sides 36, and this reduces steadily towards the centre 37. A linear change is shown in the figures between the outer sides 36 and the centre 37. This is by way of example only, and indeed the height of the lighting lamella 30 could vary in a curved manner, either concave or convex curved. The provision of this dip in the height of the lighting lamellae 30 towards the centre 37, is advantageous as it allows for the fluorescent tube to be located within this dip and at the centre 37. Providing the lighting lamellae 30 with a surface which goes above the lower point of the fluorescent tube, not only improves the light distribution around a room, but allows for a reduced height lighting lamellae 30.

[0058] The above disclosure of both the light housing 10 and lighting lamellae 30, can clearly be combined to generate an appropriately narrow light housing 10. The aspects described with respect to each of the light housing 10 and lighting lamellae 30 are not intended to be specifically limiting. Any implied combination of features for each of these structures is not intended to be a specific limiting combination, and indeed all aspects of each of the light housing 10 and lighting lamellae 30 are to be considered as interchangeable and optional depending upon the desired results. Primarily, both the light housing 10 and lighting lamellae 30 are advantageously structured and designed to lead to narrower light fittings, and are particularly useful with the narrow diameter fluorescent tubes.

[0059] Reference Numerals

1 Suspended Ceiling
2 Light Fitment
3 Concrete Ceiling
4 Light Fitting
10 Light Housing
11 Flat Front Surface
12 Recessed Portion
13 Recessed Box
14 Metal Sheet
15 Side Wings
16 Back Surface
17 Flaps
18 Short Side
19 Long Side
30 Lighting Lamellae
31 Bottom Portion
32 Side Sheets
33 Vertex
34 Straight Line
35 Upper Edges
36 Outer Sides
37 Centre
38 Top Surface
39 Centre Line
40 Lower Portion
41 Intermediate Portion
42 Upper Portion

Claims

1. A light housing (10) for fitment within a suspended ceiling (1), wherein
the light housing (10) comprises a generally flat front surface (11) for fitting flush with the lower side of the suspended

ceiling (1), wherein a recessed portion (12) is provided within the front surface (11) for housing a lighting fitment (2), the recessed potion (12) being structures as a recessed box (13) open at the face coinciding with the plane of the front surface (11) and closed on the remaining five sides; wherein
the entire light housing (10) is made from a single cut, formed and folded material sheet, preferably one of a metallic (14) or plastic material.

2. The light housing (10) according to claim 1, wherein the light housing (10) has either a square or rectangular shape, and the recessed portion (12) extends from one side of the light housing (10) to the other side of the light housing (10) to form a square or rectangular recessed box (13), wherein
two of the side walls of the recessed portion (12) are formed by the metallic sheet (14) being bent in a first direction and then further bent back on itself in a second direction opposite to the first direction so as to create a step, with this repeated at either side of the recessed portion (12) to define the side walls and width thereof; and
side wings (15) extend from, and are integral with, the back surface (16) of the recessed portion (12), these extending away from the plane of the back surface (16) such that they form the two remaining side walls of the recessed portion (12).

3. The light housing (10) according to either of claims 1 or 2, in particular claim 2, wherein the side wings (15) are wider than the width of the recessed portion (12) and are provided with flaps (17) which extend in the plane of the flat front surface (11), some of the flaps (17) being attached to back surface of the flat front surface (11) to improve the rigidity of the light housing (10); wherein
flaps (17) provided such that they align with the recessed portion (12) can be used to hold the light fitment (2) in place.

4. The light housing (10) according to any one of the previous claims, in particular claim 3, wherein
the side wings (15) have a trapezoidal shape, the short parallel side (17) being the same length as the width of the back surface (16) of the recessed portion (12) and the long side being the same length as the side of the light housing (10), such that the light housing (10) may be utilised within a suspended ceiling (1) which is very close to the concrete ceiling (3).

5. The light housing (10) according to any one of the previous claims, in particular claim 4, wherein
the recessed portion (12) is between 30mm and 50mm deep, preferably between 35mm and 45mm deep, further preferably around 40mm deep;
wherein further preferably, the light housing (10), by virtue of the side wings (15) can be positioned within a hole (4) in a suspended ceiling (1) wherein the gap between the suspended ceiling (1) and the concrete ceiling (3) is 100mm.

6. A method of making a light housing (10) comprising:

providing a single metallic sheet (14);
stamping out a design from the metallic sheet (14);
bending a central portion of the metallic sheet (14) to provide four bends running approximately parallel with each other to provide two steps opposing each other and separated by a back surface (16) so as to define a recessed portion (12) within a flat front surface (11);
bending side wings (15) which are formed integral with the back surface (16) of the recessed portion (12) over to form the remaining two side walls of the recessed portion (12).

7. The method of claim 6, further comprising:

forming the side wings (15) to be wider than the recessed portion (12) so that after bending the side wings (15) flaps (17), which are formed at the lower end of the side wings (15), can be attached to the rear side of the flat front surface (11),
preferably by spot welding, so as to strengthen the light housing (10).

8. The method of either of claims 5 or 6, wherein the side wings (15) are formed with a trapezoidal shape, wherein the short parallel side (17) has the same length as the width of the back surface (16) of the recessed portion (12) and the long side has the same length as the side of the light housing (10), such that after bending and attaching the flaps (17), the light housing (10) may be utilised within a suspended ceiling (1) which is very close to the concrete ceiling (3).

9. A lighting lamellae (30) for use in a light fitting (4) comprising:

a generally V-shaped cross-sectional shape defined by two side sheets (32) which join at an extended bottom portion (31) defining the vertex (33) of the V, wherein
the bottom portion (31) has a straight line (34) shape which runs along the full length of the lighting lamellae (30), wherein
the side sheets (32) extend from the bottom portion (31) to the two upper edges (35), forming the tops of the V of the lighting lamellae (30), in a curved manner to give the V-shape outwardly curving side walls, wherein further the two upper edges (35) extend in generally the same direction as the bottom portion (31) with a curved profile along this direction, such that at the two outer sides (36) of the lighting lamellae (30) the two upper edges (35) are closer together than at the centre (37) of the lighting lamellae (30), with this separation distance varying in a non-linear manner between the outer sides (36) and the centre (37).

10. The lighting lamellae (30) of claim 9, wherein the distance between the two upper edges (35) and the bottom portion (31) varies along the extending direction of the lighting lamellae (30), wherein the distance is a maximum at each of the outer sides (36) and a minimum at the centre (37) of the lighting lamellae (30), wherein
the variation in the distance between the upper edges (35) and the bottom portion (31) varies in one of a linear or non-linear manner, wherein the non-linear variation can follow a concave or convex curve between the outer sides (36) and centre (37).

11. The lighting lamellae (30) of either of claims 9 or 10, wherein the outwardly curving side walls formed by the two side sheets (32) have a radius of curvature which constantly varies as the side walls progress from the bottom portion (31) to the upper edges (35); and wherein preferably
the variation in the separation distance between the top upper edges (35) has a constantly varying radius of curvature from the outer sides (36) to the centre (37).

12. The lighting lamellae (30) of either of claims 9 or 10, wherein the outwardly curving side walls formed by the two side sheets (32) have a lower portion (40) in which the separation distance between the two side sheets (32) varies in a linear manner when moving from the vertex (33) toward the two upper edges (35), wherein the separation does not alter along the length direction of the lighting lamellae (30), wherein further
this lower portion (40) leads into an intermediate (41) and upper portion (42) in which the separation width between the two side sheets (32) varies in a non-linear manner when moving from the top of lower portion (40) to the two upper edges (35), wherein this non-linear variation preferably proceeds with a constantly varying radius of curvature; wherein within the intermediate portion (41) the separation distance between the two side sheets (32) does not alter along the length direction of the lighting lamellae (30), wherein further
the variation in the separation distance between the top upper edges (35) has a constantly varying radius of curvature from the outer sides (36) to the centre (37), and wherein this variation between the separation distance between the two side sheets (32) progresses from the top upper edges (35) within the upper portion (42) to the top edge of the intermediate portion (42).

13. The lighting lamellae (30) according to claim 12, wherein the lower portion (40) extends for between 40% and 60% of the vertical height of the lighting lamellae (30); more preferably for between 45% and 55% of the vertical height of the lighting lamellae (30); most preferably for about 50% of the vertical height of the lighting lamellae (30); wherein the upper portion (42) extends from a point which lies between 60% and 80% up the vertical direction of the lighting lamellae (30); more preferably from between 65% and 75% up the vertical direction of the lighting lamellae (30); most preferably from about 70% up the vertical direction of the lighting lamellae (30); wherein further
the intermediate portion (41) appropriately bridges the gap left between the lower (40) and the upper (42) portions.

14. The lighting lamellae (30) of any one of the claims 9 to 13, wherein a top surface (38) is provided which joins the two upper edges (35) to form a closed-top-V cross section, wherein
the top surface (38) is one of:

generally flat between the two upper edges (35) to form a triangular cross section; or
peaked along the centre line (39) between the two upper edges (35) to form a diamond-like cross section; or
recessed along the centre line (39) between the two upper edges (35) to form an arrow head-like cross section.

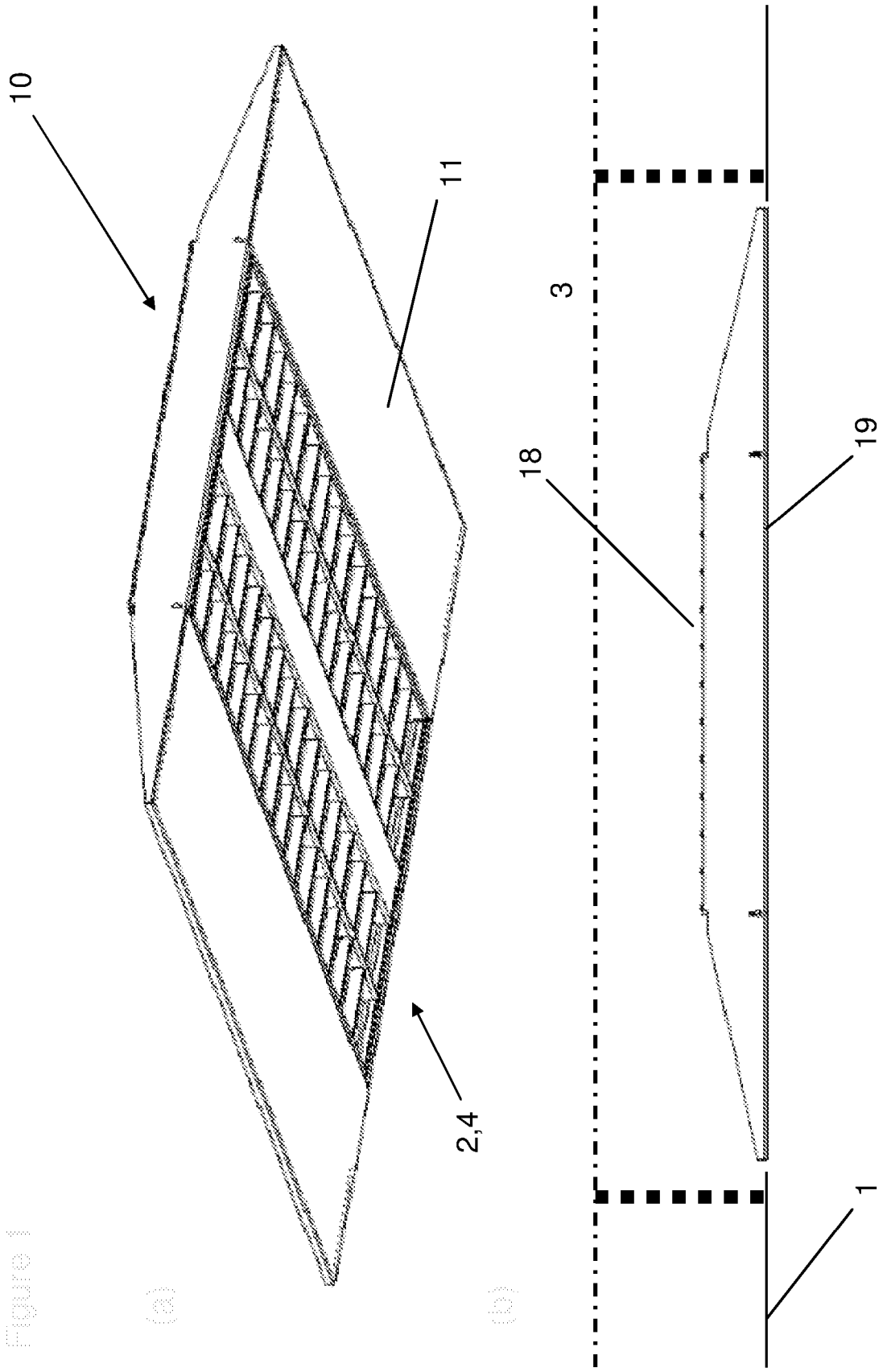


Figure 1

Figure 2

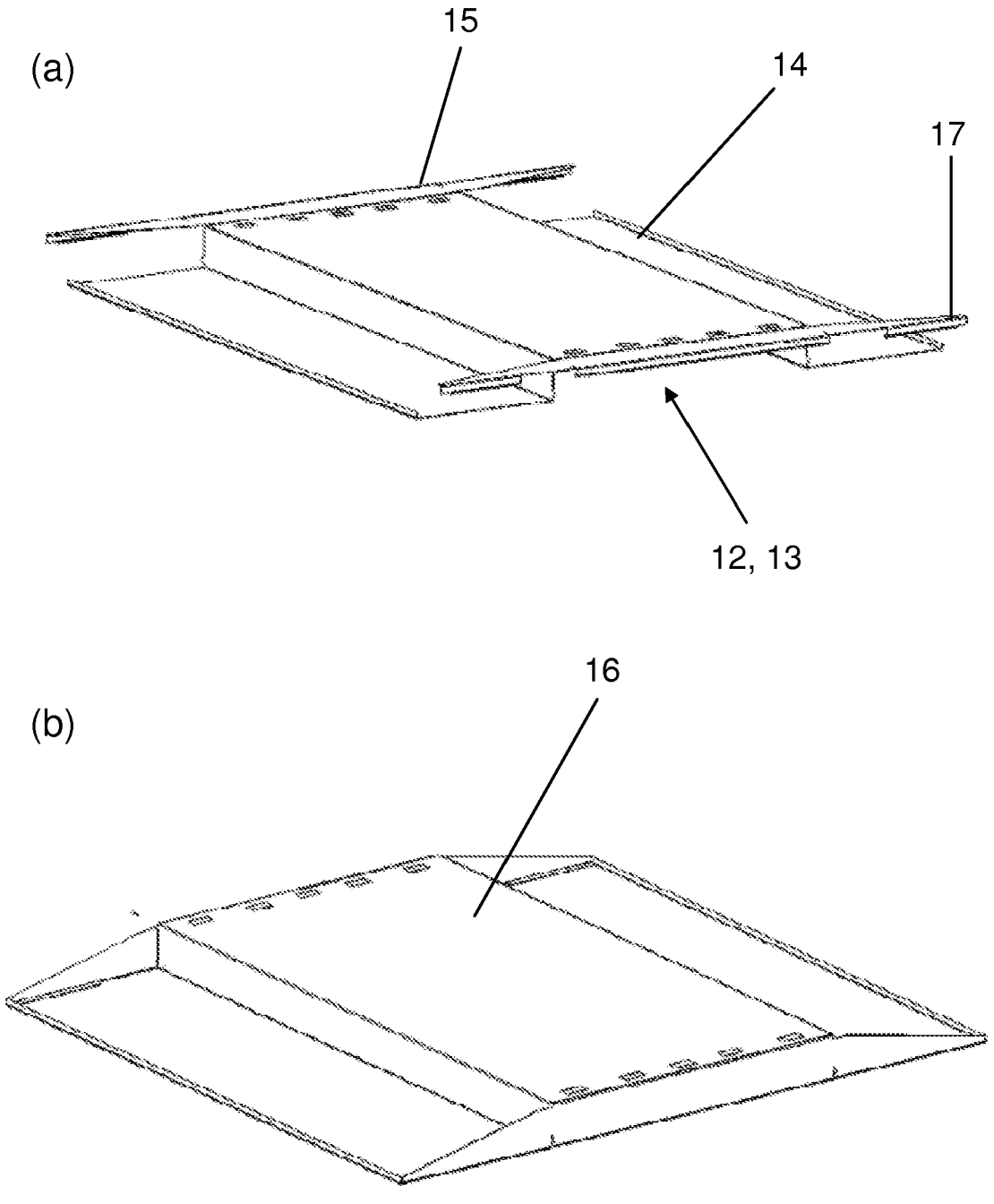


Figure 3

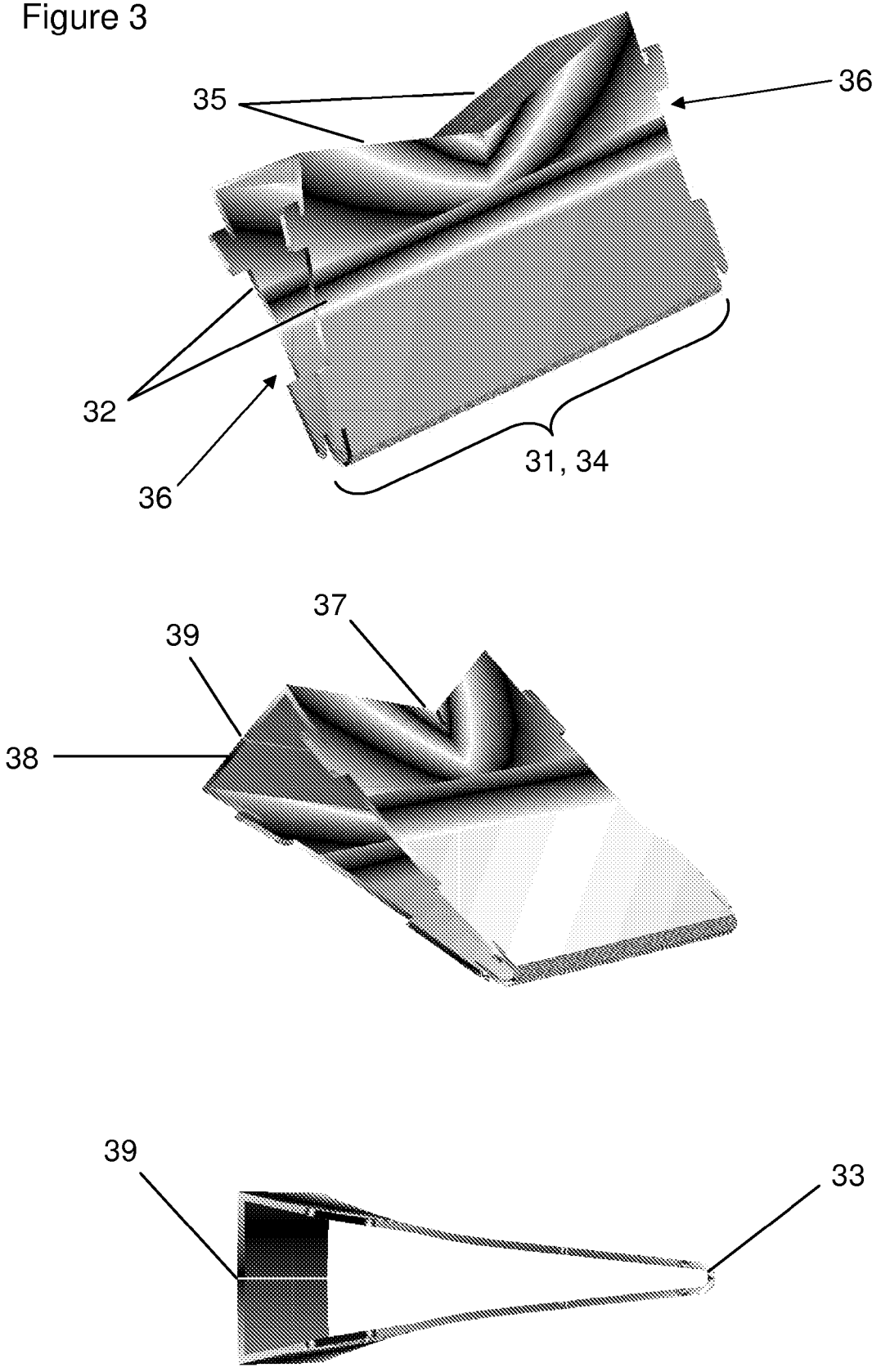
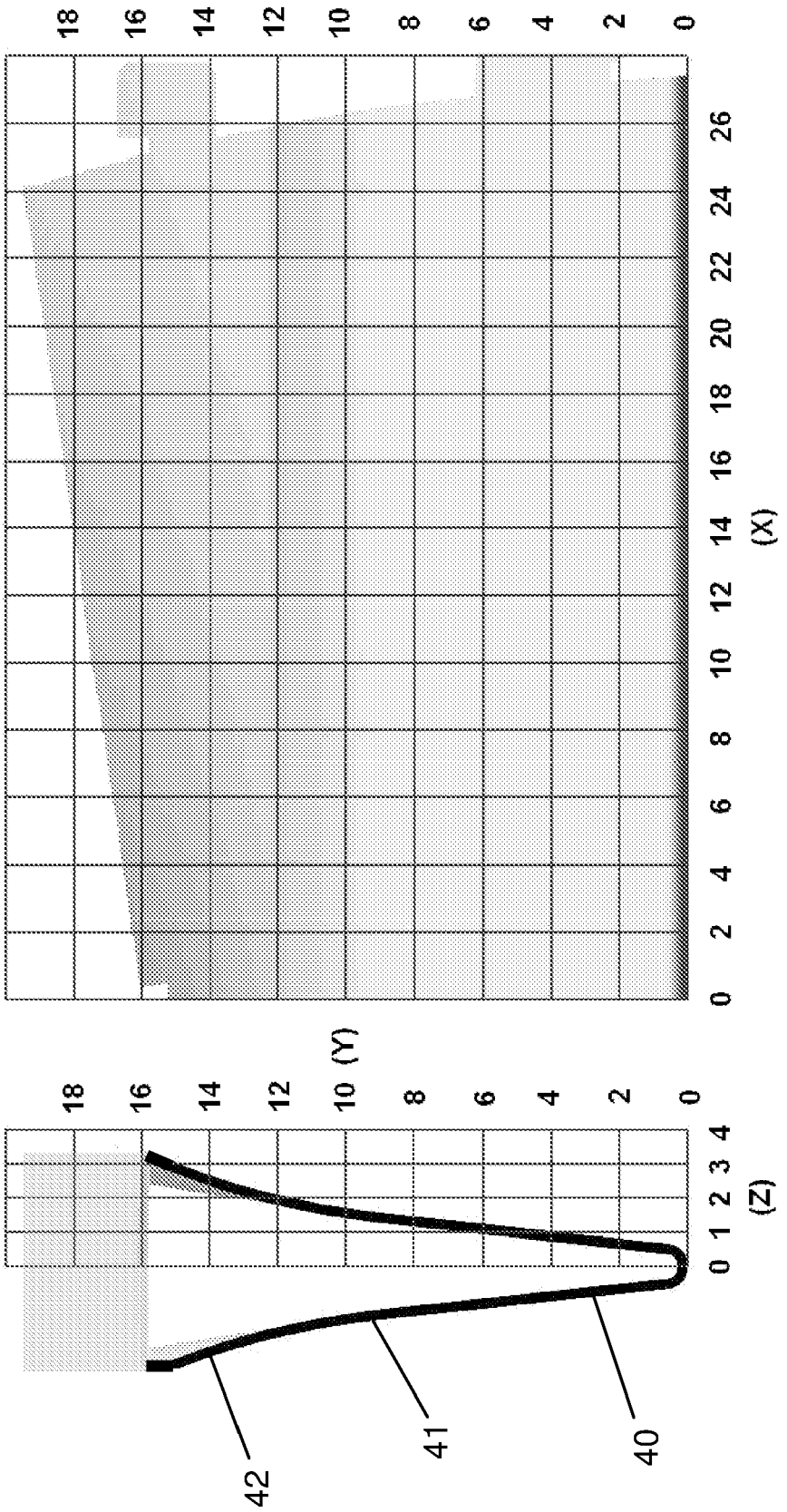


Figure 4


18
16
14
12
10
8
6
4
2
0
(Y)
0 2 4 6 8 10 12 14 16 18 20 22 24 26
(X)
0 1 2 3 4
(Z)
42
41
40

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 15 6949

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	EP 0 999 410 A (ZUMTOBEL STAFF GMBH [AT] ZUMTOBEL LIGHTING GMBH [AT]) 10 May 2000 (2000-05-10) * paragraph [0018] * * figures 1-3 *	1,2,5,6	INV. F21V15/01 F21S8/02 ADD. F21V11/02
X	EP 1 256 758 A (ZUMTOBEL STAFF GMBH [AT] ZUMTOBEL LIGHTING GMBH [AT]) 13 November 2002 (2002-11-13) * paragraph [0014] * * figures 1,2 *	1-3,5-7	
X	US 2003/002279 A1 (FIENE DALE E [US]) 2 January 2003 (2003-01-02) * paragraphs [0067], [0072] * * figures 3,14 *	1,4-6	
X	US 2005/024856 A1 (HELENOWSKI JACEK [US]) 3 February 2005 (2005-02-03) * paragraph [0023] * * figures 2,8 *	1,5-7	
X	GB 2 239 085 A (MOORLITE ELECTRICAL LTD [GB]) 19 June 1991 (1991-06-19) * abstract; figures 1a,2 *	1,2	TECHNICAL FIELDS SEARCHED (IPC) F21V F21S
X	US 5 034 859 A (GAWAD MAHMOUD A [CA] ET AL) 23 July 1991 (1991-07-23) * column 2, line 52 - column 3, line 14 * * figures 1,2,5 *	1	
X	EP 1 094 272 A (LUXONIC LIGHTING PLC [GB]) 25 April 2001 (2001-04-25) * paragraphs [0021], [0023], [0024] * * figures 3,5,6 *	9-13	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 September 2009	Allen, Katie

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

EPO FORM 1503 03.82 (P04C01)

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 15 6949

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 5 528 478 A (DEGELMANN PAUL G [US]) 18 June 1996 (1996-06-18) * column 3, line 50 - line 65 * * figures 3,4 *	9,11-14	
X	WO 03/064918 A (KONINKL PHILIPS ELECTRONICS NV [NL]; KOSTERS PAULUS G H [NL]; HOLTEN P) 7 August 2003 (2003-08-07) * page 5, line 12 - line 21 * * figures 2-4 *	9-13	
X	US 5 758 954 A (HOLTEN PETRUS A J [NL] ET AL) 2 June 1998 (1998-06-02) * column 8, line 39 - line 45 * * figures 14,15 *	9,10, 12-14	
X	WO 2006/084235 A (SYLVAN R SHEMITZ DESIGNS INC [US]; SHEMITZ SYLVAN R [US]; ZAHAREWICZ J) 10 August 2006 (2006-08-10) * paragraph [0045] * * figures 6A-6D *	9	TECHNICAL FIELDS SEARCHED (IPC)
A	EP 1 306 611 A (SLI FRANCE [FR]) 2 May 2003 (2003-05-02) * figures 3-6 *	12	
A	WO 98/45646 A (FAGERHULTS BELYSNING AKTIEBOLA [SE]; JOHANSSON JOERGEN [SE]) 15 October 1998 (1998-10-15) * figures 10-12 *	10,14	
A	GB 2 350 419 A (SITECO BELEUCHTUNGSTECH GMBH [DE]) 29 November 2000 (2000-11-29) * figures 1,3 *	14	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 September 2009	Allen, Katie

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

EPO FORM 1503 03.82 (P04C01)

Europäisches Patentamt
European Patent Office
Office européen des brevets

Application Number
EP 09 15 6949

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due 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 those claims for which no payment was due.

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:

☐ The present supplementary 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 (Rule 164 (1) EPC).

Europäisches Patentamt
European Patent Office
Office européen des brevets

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 09 15 6949

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: 1-8

   A light housing and a method of making a light housing

   ---

2. claims: 9-14

   A lighting lamellae for use in a lighting fitting

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 15 6949

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-09-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0999410 A	10-05-2000	AT 348291 T	15-01-2007
		DE 29819890 U1	16-03-2000
EP 1256758 A	13-11-2002	AT 373202 T	15-09-2007
		DE 10122126 A1	14-11-2002
		NO 20022186 A	11-11-2002
		PL 353756 A1	18-11-2002
US 2003002279 A1	02-01-2003	NONE	
US 2005024856 A1	03-02-2005	NONE	
GB 2239085 A	19-06-1991	NONE	
US 5034859 A	23-07-1991	CA 2049015 A1	27-06-1991
		WO 9110095 A1	11-07-1991
EP 1094272 A	25-04-2001	US 6443598 B1	03-09-2002
US 5528478 A	18-06-1996	CA 2180712 A1	05-04-1997
		CN 1164627 A	12-11-1997
		DE 19635906 A1	10-04-1997
WO 03064918 A	07-08-2003	AT 395557 T	15-05-2008
		AU 2003201486 A1	02-09-2003
		CN 1625667 A	08-06-2005
		US 2005063190 A1	24-03-2005
US 5758954 A	02-06-1998	AT 192562 T	15-05-2000
		AU 700856 B2	14-01-1999
		AU 4495096 A	04-09-1996
		CA 2187776 A1	22-08-1996
		CN 1148884 A	30-04-1997
		DE 29602357 U1	11-04-1996
		DE 69608044 D1	08-06-2000
		DE 69608044 T2	11-01-2001
		ES 2147914 T3	01-10-2000
		HU 9602819 A2	28-05-1997
		WO 9625623 A1	22-08-1996
		JP 10502765 T	10-03-1998
		NZ 300261 A	24-11-1997
		PL 316795 A1	17-02-1997
		TW 424871 Y	01-03-2001
WO 2006084235 A	10-08-2006	CA 2596843 A1	10-08-2006

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 15 6949

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-09-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1306611 A	02-05-2003	DE 20221845 U1	28-08-2008
		FR 2831649 A1	02-05-2003
WO 9845646 A	15-10-1998	AU 5889998 A	30-10-1998
		DE 69830482 D1	14-07-2005
		DE 69830482 T2	16-03-2006
		EP 0972158 A1	19-01-2000
		NO 994120 A	26-08-1999
		SE 507223 C2	27-04-1998
		SE 9701216 A	27-04-1998
GB 2350419 A	29-11-2000	AT 500187 A1	15-11-2005
		DE 19916601 A1	19-10-2000

EPO FORM P0459

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