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(54) **Hinged connector for an illuminated signs**

(57) A connector (7) for enabling mounting of an illuminated sign (1) to a surface, the connector comprising first (8) and second (9) portions which are freely pivotable relative to one another, each portion provided with electrical connection means, the electrical connection means being electrically connected together, the first portion (8) being adapted for mechanical and electrical connection

with an exit sign (1) and the second portion (9) being adapted for mechanical and electrical connection to a power supply unit (6) or other apparatus mounted on a surface, whereby relative pivoting of the two parts enables the signs to hang substantially vertically regardless of the disposition of the surface.

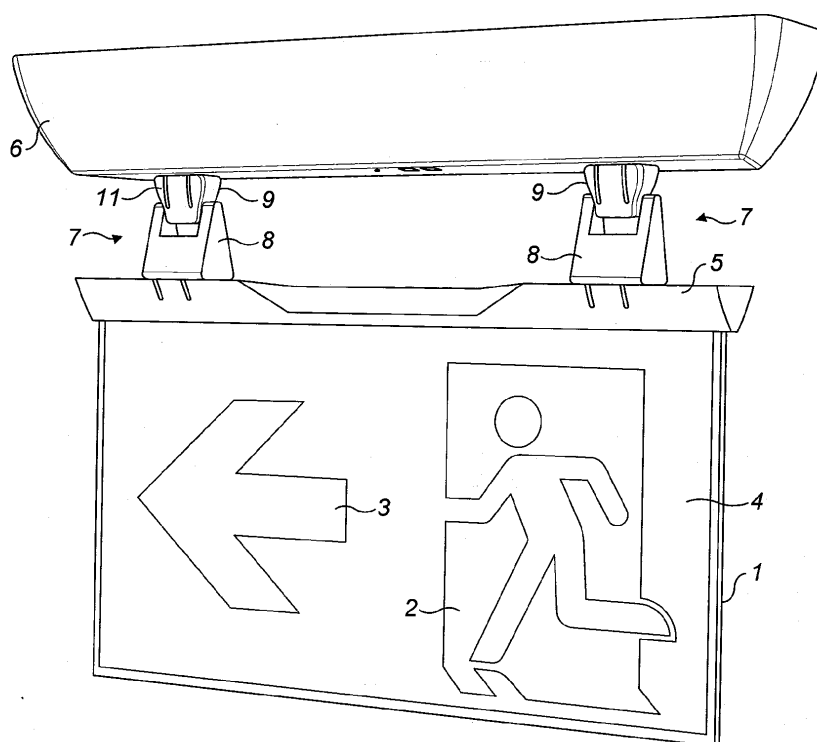


FIG. 1

Description

[0001] This invention relates to illuminated signs. In particular, it relates to illuminated exit signs which are used to indicate the direction of exits from shops, commercial premises, entertainment venues and other public or private spaces.

[0002] Illuminated exit signs generally include one or more illumination sources (such as an array of one or more LEDs) mounted usually at or towards their top. Light is distributed from this LED array through a front and/or rear face of the sign when the sign is suspended in order to illuminate a graphical image on the sign. This image includes directional indication so that the sign can be placed so as to indicate the nearest emergency exit or change of direction. The light emitting means may receive power from a power supply unit to which it is connected. Often, the power supply unit is mounted on a ceiling and the exit sign is then suspended from there with an electrical connection therefrom.

[0003] Sometimes it is required to mount an exit sign on a surface other than a ceiling, for example on a wall. Up to now, this has often required a different exit sign to be provided, or a different fitting method or fitting connection.

[0004] It is also sometimes required to fit the sign into a recessed area of a ceiling or other surface and this again often requires different fittings.

[0005] The present invention arose in an attempt to provide an improved apparatus and method for affixing or suspending an exit sign from a range of surfaces.

[0006] According to the present invention in a first aspect, there is provided a connector for enabling mounting of an illuminated sign to a surface, the connector comprising first and second portions which are freely pivotable relative to one another, each portion provided with electrical connection means, the electrical connection means being electrically connected together, the first portion being adapted for mechanical and electrical connection with an exit sign and the second portion being adapted for mechanical and electrical connection to a power supply unit or other apparatus mounted on a surface, whereby relative pivoting of the two parts enables the signs to hang substantially vertically regardless of the disposition of the surface.

[0007] One of the portions may comprise two arms and a second portion be arranged to fit between the arm and pivotally connected thereto.

[0008] The portion with arms may be formed in two parts which are assembled to sandwich the second portion between to form the pivoting connection.

[0009] This enable convenient construction which is easy to assemble.

[0010] The electrical connection between the two portions may be by a wire or other electrical connection and this may be routed in the vicinity of one or more pivot points.

[0011] The or each means for mechanically connecting

the connector to a sign and/or other apparatus may comprise one or more resiliently deflectable tabs and one or more clip portions.

[0012] In a further aspect the invention provide an illuminated sign assembly, comprising a sign having an illumination means, the sign being provided with a respective connection part for providing mechanical and electrical connection with each of one or more connectors as described above and a further assembly adapted for mounting to a ceiling, wall or other surface, or a recess therein, and provided with means for mechanically and electrically connecting to the other portion of the connector.

[0013] Said other apparatus may comprise a power supply unit.

[0014] In a further aspect, the invention provides a method of suspending an illuminated sign from a surface, comprising using a connector between an illuminated sign and a power supply unit (PSU), other apparatus or a surface, to thereby suspend the illuminated sign from the PSU surface or apparatus such that, whatever angle the surface is, the illuminated sign depends generally vertically.

[0015] The pivoting connector enables the sign to be suspended from a support or surface which is horizontally or substantially horizontal (eg a ceiling), which is vertical or substantially vertical (eg a wall) or which is at other angles or is an uneven surface. The connector is preferably arranged such that one part can pivot through 180° although it may be arranged to have a pivoting angular range greater or less than this.

[0016] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows an exit sign suspended from a power supply unit mounted to a ceiling;

Figure 2 shows an exit sign suspended from a power supply unit mounted to a wall;

Figure 3 shows an exit sign mounted to a plate;

Figures 4 and 5 show views of a connecting part;

Figure 6 shows schematically how portions of the connecting part are fixed together;

Figure 7 also shows a view of how the parts fit together;

Figure 8 shows a side view of a connecting part;

Figure 9 shows a side view of the two portions at a different angle;

Figure 10 shows a side view with the two portions that are at a further different angle; and

Figure 11 shows schematically a top view of an exit sign.

[0017] Figure 1 shows an exit sign in a position where it is suspended from a ceiling. The sign 1 is generally planar, typically made of a plastics material that can transmit light with a graphical image showing a running man 2 and a directional arrow 3. The sign is intended to

be placed in a position where it points to an exit which can be used in an emergency situation.

[0018] The sign is generally rectangular and is affixed, at its top end 4, to an LED assembly 5, referred to below as LED strip. When the sign is illuminated these emit light into the sign body and this light is emitted through the face bearing the graphical image 2, 3, in conventional fashion.

[0019] The sign is suspended from a power supply unit 6 which is itself mounted to a ceiling (not shown).

[0020] In a typical prior art installation, the sign may be directly connected to the power supply unit which will therefore have a mechanical and electrical connection for respectively mechanically and electrically connecting with the sign.

[0021] In this embodiment, however, the sign is connected to the power supply unit (PSU) 6 via one or more (in this case two) connecting parts or flexible connecting joints 7. Two such joints are shown in the figure and these are what the currently preferred embodiment uses, but there may be just one connector or more than two connectors.

[0022] Each of these comprises two portions which can pivot (ie rotate) relative to one another. These comprise a lower portion 8 and an upper portion 9. The lower portion 8 has a means (shown more clearly in other figures, such as Figure 5 and described below) for mechanically and electrically connecting to cooperating mechanical and electrical connections on the LED strip 5. Upper connector 9, which is pivotable relative to lower portion 8, also has mechanical and electrical connection means for connecting to cooperating means on the PSU 6. These would be on the underside of this, as shown in Figure 1. Alternatively, there may be a side or other parts or faces of this.

[0023] The two portions 8 and 9 can most preferably freely pivot relative to one another. This is so that whatever the angle of upper part 9 (when connected to a body such as a PSU 6) if a sign 1 is attached to the lower portion 8 then the connector will pivot such that, whatever the angle of upper portion 9, lower portion 8 and the exit sign 1 will lie, under the influence of gravity, in a generally vertical disposition.

[0024] Figure 2 shows a scenario where the PSU 6 is mounted on a wall instead of a ceiling. It is therefore turned through substantially 90°. As described, in this case the upper portion 9 of the connector which is mechanically and electrically affixed to the PSU 6 lies in a generally horizontal disposition but the lower portion 8 and connected sign 1 lie in a generally vertical disposition by virtue of the relative pivoting.

[0025] Clearly, the sign is not restricted to being mounted on a horizontal surface (ie ceiling) or vertical surface (ie wall) and may be mounted on any convenient surface which may be at any angle, even if it is mounted to a PSU that is at, say, 45° or any other angle to the vertical, the pivoting joint of the connector enables the sign to still hang vertically. The surface may alternatively be uneven,

as, when there are two or more joints, these can rest at different pivot angles.

[0026] In some embodiments the pivoting joint between the portions 8 and 9 may enable relative position over an angular range of at least 180°, although in other embodiments the allowed pivoting may be over a greater or lesser angular range than this.

[0027] The construction of the connector is described in more detail below.

[0028] The lower portion, for example, may have a front and/or rear ledge or shoulder 10 against which a front and/or rear face 11 of the upper portion can abut at the extreme of the allowed angular range and of course by providing these ledges or shoulders on both sides then the full angular pivoting range can be restricted in both directions.

[0029] In some embodiments, the upper part of the connector need not be connected directly to a power supply unit and may be simply connected to suitable connection means on a surface, or as shown in Figure 3, a connection plate 12 and this may be very convenient when the sign is to be mounted within a recess part of a ceiling, for example. A separate electrical connection (not shown) may then be made between a power supply unit and an electrical terminal on portion 9 for supply power via the connector to the exit sign 1. The power supply unit may therefore be remote, or a distance from the actual sign.

[0030] The sign may also be suspended via cables, for example, where it is useful to be mounted a distance below a ceiling, such as a high ceiling. In this case, a cable may terminate in an appropriate connector which provides mechanical and electrical connection to the upper connector portion 9.

[0031] Other mounting methods and dispositions will be apparent.

[0032] Figures 4 and 5 show the assembled connector in detail, and Figures 6 and 7 show schematically parts of the connector in an unassembled state showing how the two portions are connected.

[0033] Referring to Figures 4 and 5, the lower portion 8, which will generally be formed in two pieces, has, when assembled, two side arms 13 and 14 and a connecting base portion 15. On the underside of this base portion (Figure 5) is a hole 16 having a generally rectangular central portion 17. At each of the ends (in the length direction) is a pair of collinear ribs 17, 18 and 19, 20 and an extension of the hole extends between each pair of ribs (eg ribs 17 and 18). The ribs act as strengthening members. The hole extensions 20, 21 each end in a general arcuate portion 22. Alternatively, these may be separate holes not joined to the central portion 17. Note that the hole 16 is formed in a plate forming part of the base 15, there being a cavity above the base and between the arms 13, 14 and the side of the base part 15.

[0034] The extensions 20 and 21 are designed to receive pins extending from the top of the sign 1 and shown more clearly in Figure 11 which is a top view of the LED

strip part of the sign and these pins are shown at 23. They thus serve to locate the connector in position. As described, generally two connectors and associated sets of pins will be provided, spaced along the top surface of the sign.

[0035] The LED strip also includes resiliently deformable tabs 24 formed by making cut outs in the top surface of the sign and these include L shaped protrusions 25. The two L shaped protrusions are spaced horizontally apart from each other leaving a gap between the linearly deflectable tabs (providing a top opening to the cavity). An electrical connecting pin of the LED strip (not shown in Figure 11) protrudes through this gap and connects to a connector provided on a substrate mounted within the cavity, thus electrically connecting the connector to the LED apparatus within the sign.

[0036] The connector may therefore be connected to the top of the sign by placing a connector in the vicinity of a set of tabs/pins on the LED bar, manually inwardly deflecting the tabs 24 such that the L shaped protrusions locate within hole 16 in portion 8, moving the connector closer to the body and releasing the resiliently deflectable tabs, thereby to cause the L shaped projections to retain the connector relative to the sign, the upstanding pins 23 being received in hole extensions 21, 22, spatially to locate the connector and the protruding electrical connection pin then being in contact with an electrical connection pin 16 provided within the connector. The pin 16 does not protrude from the connector in this or some other embodiments and therefore lies in the cavity, and may be spaced from the bottom of the connector, provided it is positioned such that the length of the pin that protrudes from the sign (LED strip) is sufficient to make good electrical contact therewith. The mounting of this electrical pin within the connector is described further below.

[0037] The upper portion 9 of the connector is pivotally attached by lateral edge portions to the inner faces of the fingers 13 and 14, as will be shown with further reference to Figures 6 and 7. It may include lateral projections which enable the portion to be held between the opposing faces 13 and 14 in such a manner that the two portions 8 and 9 can pivot relative to each other.

[0038] The upper surface of portion 9 includes resilient tabs having L shaped projections similar to those of the exit sign, as shown in Figure 4. The upper part therefore includes two resiliently deflectable tabs 26, 27, each of which have an L shaped projection 28, 29. These may be formed by cut outs in the body which do not extend along the whole length of the body, as shown by cut out 30, for example. These tab and associated projections can therefore be manually inwardly deflected by the fingers of a user and will tend to resiliently revert to their original position when released. The upper portion 9 also includes two pins 31, 32 which are generally similar to those pins 23 on the exit sign. Thus, the top face of portion 9 essentially has components similar to a connection portion (23 to 25) of the LED bar an exit sign.

[0039] The upper portion 9 can thereby mechanically

and electrically connect to cooperating mechanical and electrical connections on the underside (or other location) of a PSU, such as PSU 6 or to another apparatus. This apparatus will therefore include a hole into which the deflectable tabs can fit, as described above and lateral extensions to these (such as 21, 22) or indeed physically separate holes not connected to the central hole for receiving pins 32, 33.

[0040] The lower portion 8 may be formed in two parts and these are preferably identical parts. These may be arranged to clip together or otherwise connect, although a clipping mechanism is preferred which can be unclipped if necessary.

[0041] Whilst any pivoting mechanism can be used, a convenient one is to have lateral projections on the upper part which are secured within the inner parts of faces 13 and 14 when the two parts of the lower portion is assembled together. Figure 6 shows this in more detail.

[0042] Referring to Figure 6, the inner face of a side part 13 of lower portion 8 is shown schematically. This has an arcuate top edge 35 and in this embodiment, a series of spaced protrusions extending slightly inwardly from the face 36. The side wall 13 includes a wall 37 (see Figure 4) and the protrusions are mounted on the inner edge of the wall in the vicinity of the arcuate edge 35. These partially define a generally circular region (shown schematically by dashed region 37a) which receives a projection 39 from the side of upper portion 9 and therefore provides a pivot relative thereto.

[0043] Projection 39 may be an annular projection or, as shown, a part annular projection. It partially or wholly surrounds a through-hole 40 through which a connecting wire 41, which connects pins 6 to a pin 40 mounted within upper portion 9 and protrudes therefrom (protruding vertically in a disposition shown in Figures 4 and 6 for example). A channel 43 may also be formed in the inner face of wall 30 for receiving the wire 41 and the figures also shows ledge or shoulder 43 (shown more clearly in Figure 4).

[0044] As shown in Figure 6, the connector pin of the lower portion 8 is preferably mounted on the underside of a substrate 44 which may be mounted between ledges 45 on side wall 13 and adapted to rest, when the lower parts are connected, on the corresponding ledges on opposing side wall 14. An electrical connection is made between the pins 16 and the top of the substrate 44 and a connection wire is affixed to this, eg by soldering. The connection wire then extends along the substrate through channel 40 and, when the upper part 9 is attached through hole 45 to a substrate and pin 40 which are mounted within upper part 9.

[0045] Thus, as the upper part pivotally rotates relative to the lower part, about pivot area 37a (shown schematically by dashed lines in the figure), the connecting wire connects the two in the vicinity of the pivot point, ie substantially at the axis of rotation. That is, the electrical connector (generally a low voltage connection) goes through the pivot point.

[0046] Note that the lateral projections 39 may simply be adapted to abut (albeit loosely) an inner face of wall 13, or means such as the protrusions 36, a defining wall or walls, a recess or other means may be used to define a generally circular pivoting area in which the annular lateral projection 39 can rotate, thereby causing relative rotation of the two portions 8 and 9 of the connector. If protrusions, side walls or similar are provided, then the lateral width of the portion 9 (including any lateral projections) would then generally be of a value between the distance from the inner surfaces of faces 13 and 14 (when both parts of lower portion 8 are clipped or otherwise assembled together) down to the distance between opposed projection (ie projections on face 13 and face 14). In this way, the pivoting part will be held captive within the recess or other pivoting face and not allowed to displace substantially vertically or horizontally, ie constraining it to generally rotational movement.

[0047] The lateral extent of upper portion 9 should not, however, be such that it is received too tightly between the face and therefore friction prevents it from rotating.

[0048] Figure 7 shows one half of lower portion 8, indicating clips 52. Some of these clips may have an arrowhead or part arrowhead construction and the clips are resiliently deflectable such that cooperating clips on both parts can engage one another. Cooperating clips means are known in themselves.

[0049] The two parts of the lower portion may be themselves hingeably connected; to open to release the support portion and to close to enclose it and thereby sandwich it between them and form the pivot. This may be a clamshell type of arrangement.

[0050] Figure 7 shows the substrate 40 extending outward and this is received within the other identical part of the lower portion. As is shown in Figures 6 and 7, the connecting pin 6 is within cavity 54 and does not protrude beyond the lower surface of the portion. In such a case, the corresponding pin of the exit sign must of course protrude outwardly beyond the top face of the entry sign in order to make contact with pin 16. Similarly, pin 40 on the upper part extends outwards and can be received in a pin located within the body of a PSU or other connector and not protruding outwardly therefrom. This avoids the need for protruding pins which, when a sign is not attached, might represent a safety risk.

[0051] Figure 7 also shows slightly more clearly the electrical wire 40 extending from the pivot region of the face 30 through hole 40 and to a substrate 56 mounted within upper part 9. A connection is then made between this wire and the pin 40 which is mounted on substrate 56.

[0052] Figure 8 shows a side view of the connecting part in a generally vertical disposition, when the upper part 9 depends generally vertically from a PSU or other apparatus mounted on a wall.

[0053] Figure 9 shows an alternative disposition when the upper part 9 is mounted to an apparatus (not shown) which might be at 45° to the vertical and Figure 10 shows a similar arrangement in which it may be mounted at an

angle which is 45° in the other direction (ie 90° offset from that of Figure 9). These views are exemplary however.

[0054] Provided the pivotal connection is loose enough then even if no sign is attached to the lower part, the lower part will still hang in a generally vertical direction. In some embodiments, there may be a small degree of friction between the two pivotable parts of the connector such that the weight of the sign is necessary to displace the lower part into a generally vertical configuration.

[0055] Note that in some embodiments the upper part may be arranged with arms and the lower portion be located between these.

[0056] In other embodiments, the portions need not be arranged with one located 'within' (ie between arms of the other). There may be just one pivot point for example.

Claims

1. A connector for enabling mounting of an illuminated sign to a surface, the connector comprising first and second portions which are freely pivotable relative to one another, each portion provided with electrical connection means, the electrical connection means being electrically connected together, the first portion being adapted for mechanical and electrical connection with an exit sign and the second portion being adapted for mechanical and electrical connection to a power supply unit or other apparatus mounted on a surface, whereby relative pivoting of the two parts enables the signs to hang substantially vertically regardless of the disposition of the surface.
2. A connector as claimed in Claim 1, wherein one of the portions comprises two spaced arms and the second portion is arranged, in use, to locate within the arms in such a manner that relative pivoting of the two portions can occur.
3. A connector as claimed in Claim 2, wherein the portion having two arms comprises two parts which are assembled together to sandwich the other portion between the arms and form a pivoting connection.
4. A connector as claimed in Claim 2 or 3, wherein the second portion comprises a lateral projection at one or both lateral edges which is received by a pivot region of a respective arm.
5. A connector as claimed in Claim 4, wherein the pivot region is an inner face of an arm.
6. A connector as claimed in Claim 5, comprising means for defining a substantially circular area as the pivot face.
7. A connector as claimed in Claim 6, wherein the lat-

erally projecting extending portion or portions comprise an annular or part annular projection.

8. A connector as claimed in Claim 2 or any of Claims 3 to 7 when dependent upon Claim 2, including an electrical connection between said electrical connectors on the first and second portions, which connector is routed via a pivot point or pivot area. 5
9. A connector as claimed in any preceding claim, wherein the or each means for mechanically connecting the connector to a sign or other apparatus comprises one or more resiliently deflectable tabs. 10
10. A connector as claimed in any preceding claim, wherein one of the portions has an arm, the inner face of which has a region defining a pivot area which is delimited by one or more protrusions, walls or a recess. 15
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11. A connector as claimed in any preceding claim, wherein one of the portions has an electrical connecting pin which terminates within a body of said portion and the other portion has an electrical termination pin which projects beyond the body of that portion. 25
12. An illuminated sign assembly, comprising a sign having an illumination means, the sign being provided with a respective connection part for providing mechanical and electrical connection with each of one or more connectors as claimed in any preceding claim and a further assembly adapted for mounting to a ceiling, wall or other surface, or a recess therein, and provided with means for mechanically and electrically connecting to the other portion of the connector. 30
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13. An illuminated sign assembly as claimed in Claim 12, further comprising a power supply unit comprising means for mechanically and electrically connecting to said other portion of the connector. 40
14. A method of suspending an illuminated sign from a surface, comprising using a connector as claimed in any of Claims 1 to 10 between an illuminated sign and a power supply unit (PSU), other apparatus or a surface, to thereby suspend the illuminated sign from the PSU surface or apparatus such that, whatever angle the surface is, the illuminated sign depends generally vertically. 45
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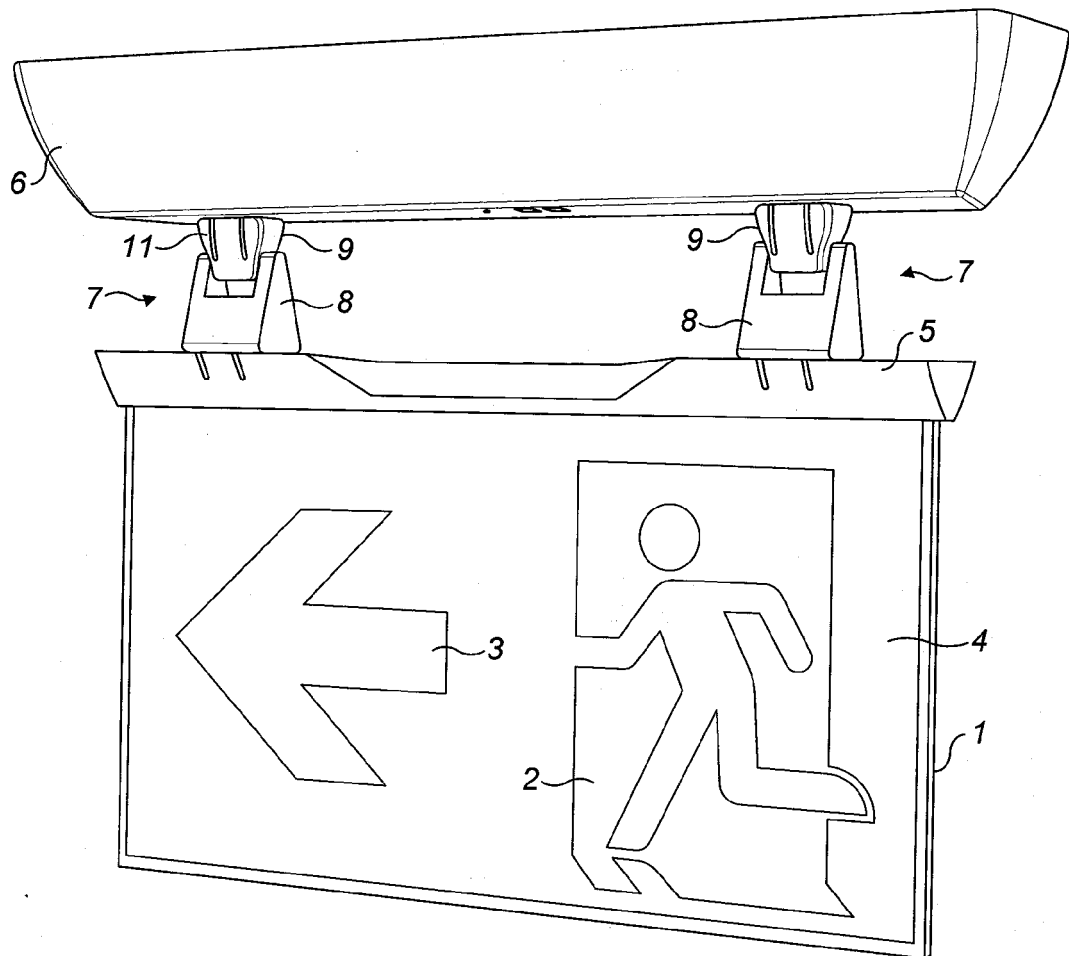


FIG. 1

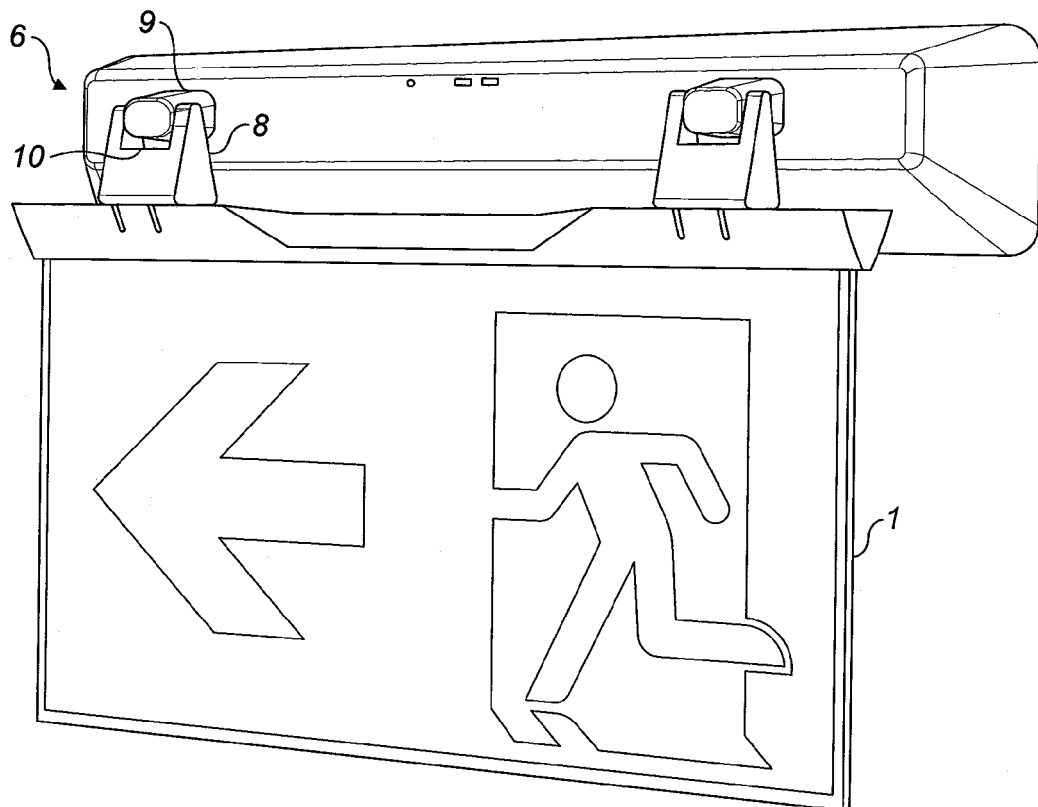


FIG. 2

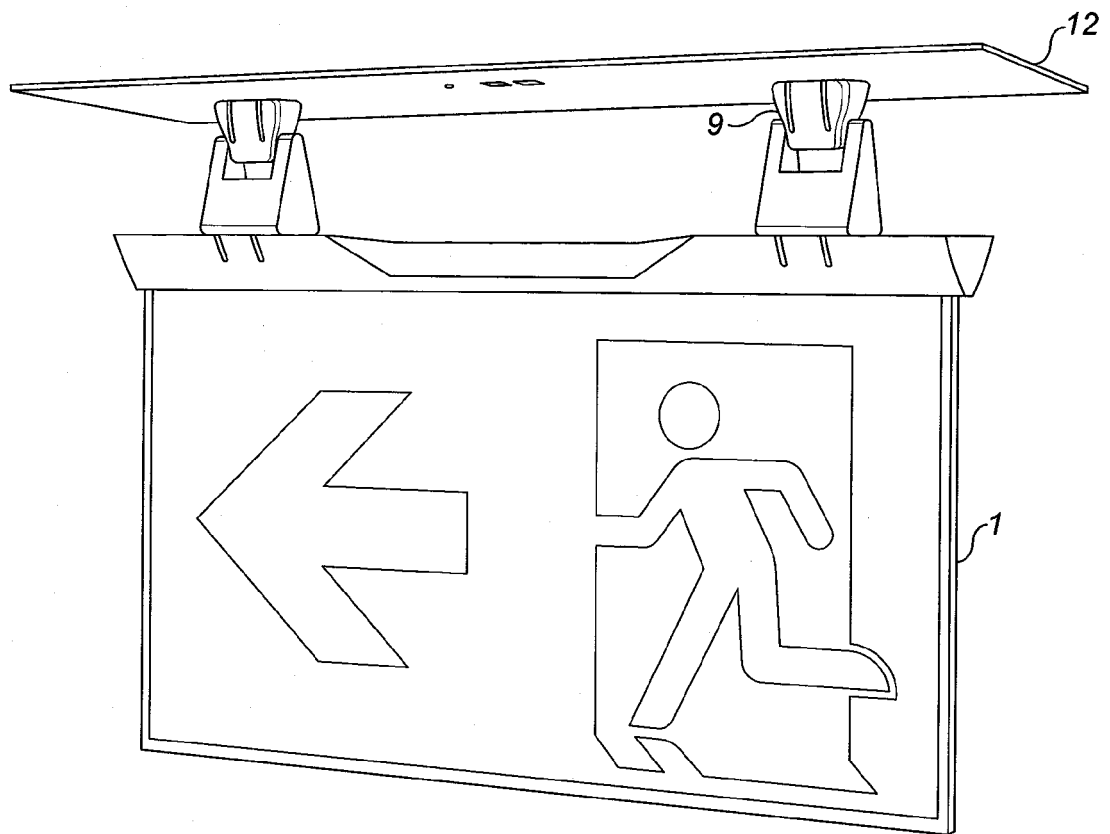


FIG. 3

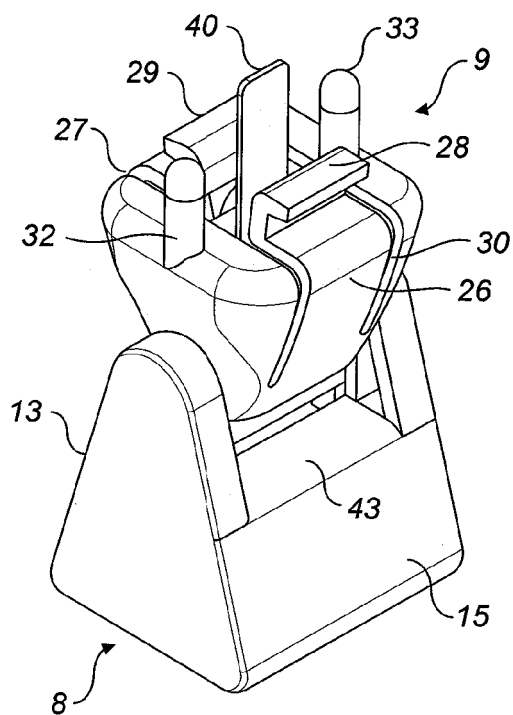


FIG. 4

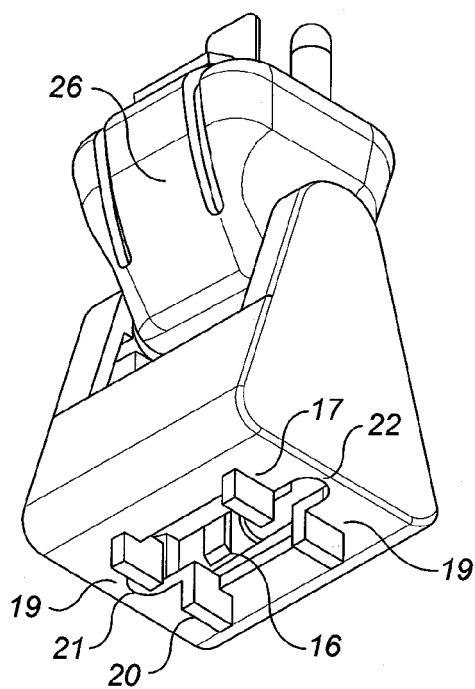


FIG. 5

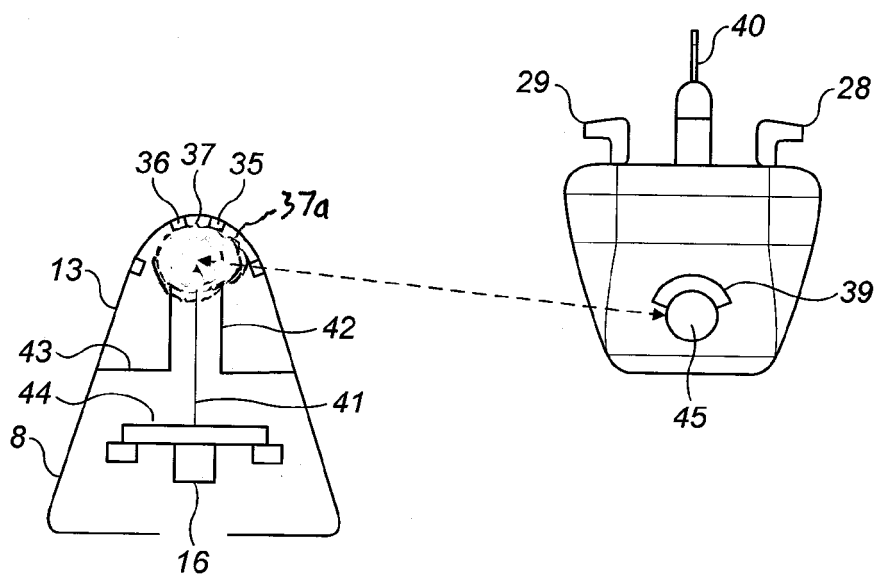


FIG. 6

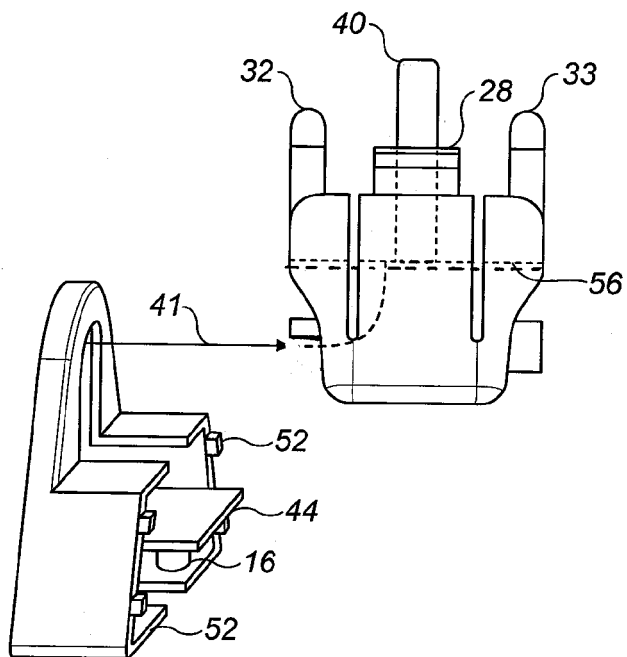


FIG. 7

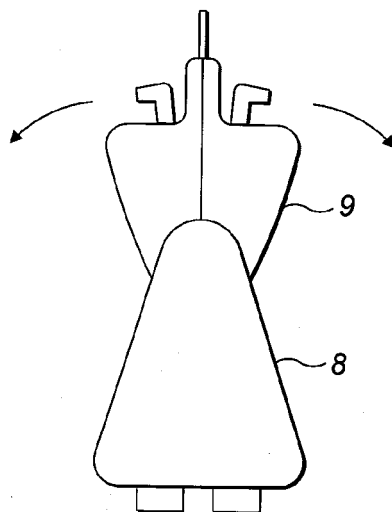


FIG. 8

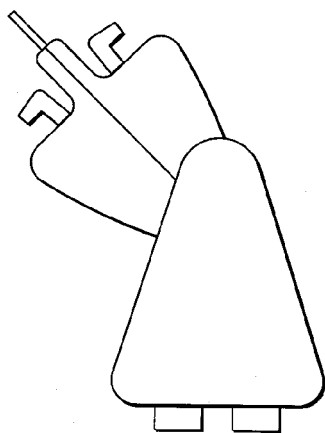


FIG. 9

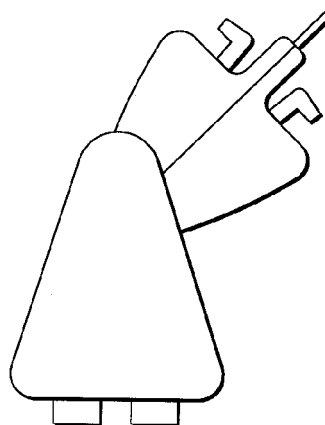


FIG. 10

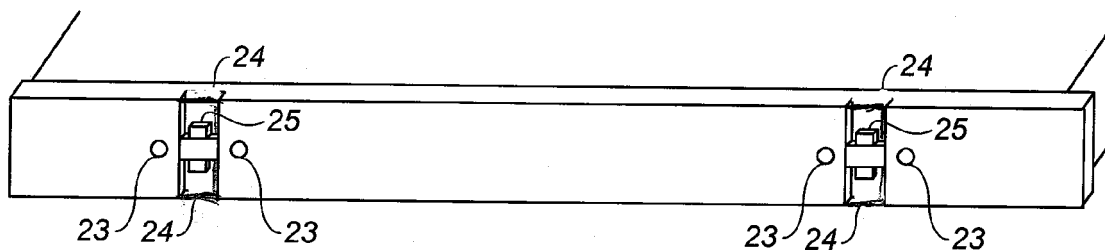


FIG. 11



EUROPEAN SEARCH REPORT

Application Number
EP 13 15 4645

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Place of search The Hague		Date of completion of the search 12 June 2013	Examiner Hugueny, Bertrand
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)



EUROPEAN SEARCH REPORT

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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 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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