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(54) **Luminaire socket outlet**

(57) A luminaire socket outlet comprising a socket body comprising a nest portion (1) and a connection portion (2), wherein the connection portion (2) comprises holes (4, 5, 6) adapted for receiving electrical installation wires and spring loaded contacts in electrical connection with the connectors of the socket outlet, wherein the socket body further comprises means (7, 8, 9; 52) for operating the spring loaded contacts for removing the electrical

installation wires from the holes, the connection portion (2) is arranged under the bottom of the nest portion (1) and the connection portion extends from the nest portion such that a corner (10) is formed between the intersecting outer surfaces of the connection portion and the nest portion, wherein the means for operating the spring loaded contacts are arranged at the corner (10) between the connection portion and the nest portion.

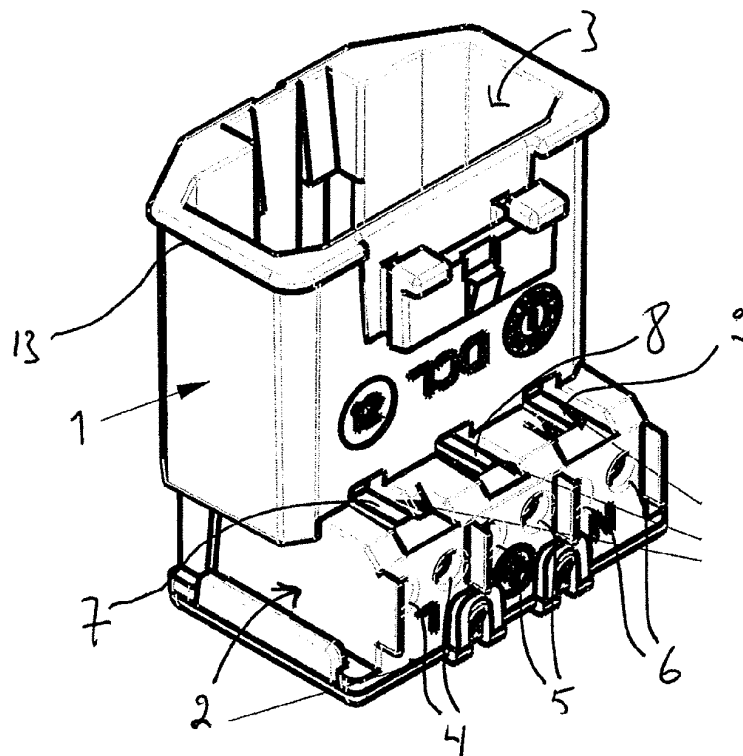


FIG 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to socket outlets and more specifically to luminaire socket outlets.

BACKGROUND OF THE INVENTION

[0002] In residential buildings the luminaires are commonly attached to ceilings using installation boxes that are either inside the ceiling or outside the ceiling. When the installation box is inside the ceiling, the lower side of the box is level with the ceiling surface. When the installation box is outside the ceiling, the box is surface mounted and protrudes from the ceiling surface.

[0003] Typically in new residential buildings the electric wide installations are inside the building structures and therefore also the boxes with the wire ends where the installations are possible, are also flush mounted.

[0004] Especially in connection with flush mounting the installation boxes have very limited amount of space inside the boxes for the installations i.e. for attaching the installation wires to permanently mounted electric equipment, such as luminaires. This is also the case with some surface mounted boxes when only the cover of the box can be detached during the installing of the wires.

[0005] In modern luminaire installations a specific luminaire socket outlet is installed in the installation box. The installed electric wires from a light switch are connected to the luminaire socket outlet such that the electricity can be connected to and from the luminaire socket. The electric installation of the luminaire socket outlets can be made only by an electrician. Once a luminaire socket outlet is installed in its place, the luminaire is connected simply by plugging a corresponding luminaire plug to the outlet.

[0006] As mentioned above, the amount of space is limited inside the connection box where the electrical connections between the luminaire socket outlet and the electric installation wires are made. The connection can be made using screws that connect the electric installation wires securely to the contacts of the socket. However, the use of screws is not easy for the electrician since the installed wires are often quite stiff. The installer needs to bend the wire, hold it in place and screw it firmly into its place. The use of screws is even more difficult when the socket is mechanically attached inside the connection box.

[0007] Another way of connecting the installation wires to the luminaire socket outlet is to use spring loaded contacts. Spring loaded contacts are metal strips inside the socket that allow the wire ends to be entered in mechanical and electrical connection with the socket. Once the wire ends are inserted inside the spring loaded contact, the ends cannot be drawn away from the socket. Thus the installation is carried out by simply inserting the wire ends to holes in which the contact attaches the wire ends.

To remove the wire ends a release mechanism is provided to the outside surface of the socket. When removing the wire, a plastic strip or slab is pressed releasing the tension pressing the wire end. While the tension is released, the wire can be drawn out of the socket.

[0008] As the installation wires are stiff and the amount of space inside the connection box is limited, the bent stiff wires inside the box may accidentally press the release mechanism so that the connection between the wire and the contacts of the outlet may become poor or loose. If the connection is poor, the resistance between the connected parts increases causing the connection to heat up. Further, if the connection is completely loose and a wire end is hanging, it may cause a risk of electric shock to a user that is not aware of the situation when attaching or removing the illumination plug from the faulty installed socket.

BRIEF DESCRIPTION OF THE INVENTION

[0009] An object of the present invention is to provide a luminaire socket outlet so as to solve the above problems. The objects of the invention are achieved by a socket which is characterized by what is stated in the independent claims. The preferred embodiments of the invention are disclosed in the dependent claims.

[0010] The invention is based on the idea of structuring the luminaire socket outlet in such a manner, that the release mechanism of the wire clamps is situated in inner edge or corner formed in the housing of the socket. Since the portion of the socket outlet through which the wire ends are pushed is substantially short, the stiff wires are not able to bend such that wires could press against the release mechanism.

[0011] According to an embodiment of the invention, the means for operating the wire release mechanism are situated inside the nest portion of the socket outlet. Since the release mechanism is inside the nest portion, i.e. the portion which is to receive the corresponding plug, it is practically impossible that the release mechanism is operated unintentionally.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] In the following the invention will be described in greater detail by means of preferred embodiments with reference to the accompanying drawings, in which

Figure 1 shows an embodiment of the luminaire socket outlet of the invention;

Figure 2 shows simplified side view of the luminaire socket outlet of the invention;

Figure 3 shows the embodiment of Figure 1 in another perspective;

Figure 4 shows an example of an installation ring; and

Figure 5 shows an example of the bottom of the nest portion of the luminaire socket outlet.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Figure 1 shows an embodiment of the luminaire socket outlet of the invention. The socket comprises a nest portion 1 and a connection portion 2 which form an integral structure. The nest portion 1 is adapted to receive a plug to opening 3, and the bottom of the nest portion includes contact surfaces in holes for making electrical contact with the contact surfaces of the plug.

[0014] The connection portion 2 comprises holes 4, 5, 6 that are adapted to receive installation wires. The installation wires are typically installed to a building and the wire ends that are to be placed in the holes are in an installation box. The holes 4, 5, 6 in the connection portion 2 lead the wire ends to spring loaded contacts that attach to the wire ends. The spring loaded contacts are elements that are tensioned metal strips which press against the wire ends in such a manner, that the wires cannot be removed from the elements unintentionally.

[0015] The spring loaded contacts are in electrical connection with the contact surfaces situated at the bottom of the nest portion. Thus electrical wires connected to the spring loaded contacts are also in electrical connection with the actual contact surfaces of the outlet such that when a plug is plugged in the nest portion, electrical connection between the contacts of the plug is made with the installed wires attached to the connection portion.

[0016] In the invention, the connection portion is situated under the bottom of the nest portion. The bottom of the nest portion is the surface having the female contacts to which the male contacts of the plug come into contact when the plug is received in the socket. The direction in which a plug is inserted into the socket defines second direction, while the direction in which the wires are received in the connection portion defines a first direction. With the above defined directions, the connection portion is situated below the nest portion in the second direction.

[0017] The connection portion 2 of the present invention extends from the nest portion 1 in the direction opposite to the first direction. Since the connection portion extends from the nest portion, a corner or inner edge is formed between the nest portion and the connection portion. The outer surfaces of the connection portion and the nest portion are not in the same direction, so that a corner is formed in the intersection between these surfaces.

[0018] Figure 2 shows a simplified side view of the socket outlet of the invention. As can be seen, the nest portion 1 and the connection portion 2 form basically an L-shaped structure. Figure 2 also shows also first direction 12 and second direction 11 and the corner between the nest portion and the connection portion.

[0019] The inserted wires can be removed from the spring loaded contacts by releasing the pressure of the contacts. To release the pressure holding the wire ends, a means for operating the contacts are operated. These means 7, 8, 9 are situated at the corner between the connection portion and the nest portion. As the wires are

attached to the holes in the connection portion, the wires cannot be bent in such a manner that the wires press against the operating means 7, 8, 9.

[0020] In the embodiment of Figure 1, the means for operating the spring loaded contacts are arranged to be operated from the outside of the socket outlet. The corner portion of the socket outlet body contains openings so that the spring loaded contacts or a structure acting on the spring loaded contacts can be pressed using a tool. A suitable tool for releasing the pressure of the contacts is, for example a screwdriver. Figure 3 shows more clearly the openings in the socket body and the surfaces of the operating means 7, 8, 9.

[0021] The spring loaded contacts are preferably arranged in such a manner, that the tension is released in most effective way when the contacts are pressed in 45 degree angle from the second direction. The luminaire socket outlet may comprise a separate installation ring that is attached to the upper part 13 of the nest portion. An example of such a ring is shown in Figure 4 and it comprises holes 14 through which the tension releasing means are operated. The ring also comprises an aperture 15 for the nest portion which engages the under the collar of the nest portion in the upper part 13 of the nest portion. Once the ring is placed in the socket, the holes 14 of the ring lead the tool used for operating the release means in a correct angle for releasing the pressure.

[0022] According to another embodiment of the invention, the means for operating the spring loaded contacts are arranged to be operated from the inside of the nest portion. In this embodiment, the bottom of the nest portion includes points that are to be pressed when the tension is to be released. Figure 5 shows a simplified view of the bottom of the nest portion as seen from above. Figure 5 thus shows only the bottom plate inside the nest portion. The bottom comprises holes 52 in which the female contact surfaces are situated and points 52 from which the pressure is released. As seen from Figure 5, these points are situated at the corner of the nest portion and the connection portion. The corner of the nest portion and the connection portion is the part of the structure, in which the outer surfaces of the connection portion and the nest portion intersect. The intersecting outer surface of the nest portion is the surface that is towards the extending connection portion and the intersecting outer surface of the connection portion is the surface that is towards the nest portion. With the directions defined above, the surfaces forming the corner are the outer surface of the nest portion which is opposite to the first direction 12 and the outer surface of the connection portion which is opposite to the second direction 11. The corner inside the nest portion is between the inner wall and the bottom of the nest portion, and the outer wall of the wall having the inner wall being towards the connection portion i.e. opposite to the first direction.

[0023] The arrow 12 in Figure 5 shows the first direction i.e. the direction in which the installation wires are to be connected to the connection portion. The operating

means inside the nest portion are also partly visible from the outside of the socket structure. In an embodiment, the operating points inside the nest portion are plastic strips continuing from the inside of the nest portion to the outside of the nest portion in the corner. The plastic strips are a part of the socket body and attach to the body in the connection portion. The connection of the plastic strips is elastic so that the strips can be pressed with a suitable tool, such as a screwdriver, and when pressed they act on the spring loaded contacts for releasing the pressure so that the wire ends can be removed from the plug.

[0024] When the means for operating the spring loaded contacts are situated inside the nest portion, the installed wires are not able to press against these means under any circumstances. Further, for removing the installed wires, the plug and therefore the load in the circuit needs to be removed first. This feature thus improves the safety of the installations.

[0025] According to another embodiment of the invention, holes adapted for receiving electrical installation wires are situated at the same side of the socket outlet. As the wires are inserted from the same side of the socket to the spring loaded contacts, the installation is made easy. The wire ends does not have to be long for the installation saving further space inside the installation box or similar enclosure.

[0026] The socket of an embodiment is adapted to receive line, neutral and ground wires. According to a further embodiment, the socket is adapted to take two line, two neutral and two ground wires for the purposes to chaining the installation. When two wires are inserted to the socket outlet, the voltage from installed wire is carried to the other wire which may be connected to another socket outlet.

[0027] An example of the type of the luminaire socket outlet of the invention is a DCL compatible socket as defined in IEC 61995-1 and IEC 61995-2.

[0028] It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

Claims

1. A luminaire socket outlet comprising a socket body comprising a nest portion (1) and a connection portion (2), the nest portion being adapted for receiving a plug for making electrical connection between the plug and connectors of the socket outlet, the connectors of the socket outlet being in the bottom of the nest portion (1), wherein the connection portion (2) comprises holes (4, 5, 6) adapted for receiving electrical installation wires and spring loaded contacts in electrical

connection with the connectors of the socket outlet, the spring loaded contacts being adapted for holding the electrical installation wires pushed through the holes (4, 5, 6) of the connection portion (2) and for making electrical connection between the connectors of the socket outlet and the electrical installation wires,

wherein the socket body further comprises means (7, 8, 9; 52) for operating the spring loaded contacts for removing the electrical installation wires from the holes, the connection portion (2) having a first direction (12) in which the electrical installation wires are to be inserted to the holes (4, 5, 6) and the nest portion having a second direction (11) in which the plug is to be inserted, the first and second directions being different, **characterized in that**

the connection portion (2) is arranged under the bottom of the nest portion (1) in the second direction (11) and the connection portion extends from the nest portion in the direction opposite to the first direction (12) such that a corner (10) is formed between the intersecting outer surfaces of the connection portion and the nest portion, wherein the means for operating the spring loaded contacts are arranged at the corner (10) between the connection portion and the nest portion.

2. A luminaire socket outlet according to claim 1, **characterized in that** the means (7, 8, 9) for operating the spring loaded contacts are arranged to be operated from the outside of the socket.
3. A luminaire socket outlet according to claim 2, **characterized in that** the socket comprises an installation ring adapted to be attached to the nest portion of the socket outlet, wherein the installation ring comprises holes (14) arranged to guide a tool into contact with the means for operating the spring loaded contacts when the installation ring is attached to the nest portion.
4. A luminaire socket outlet according to claim 1, **characterized in that** the means (52) for operating the spring loaded contacts are arranged to be operated from the inside of the nest portion.
5. A luminaire socket outlet according to claim 4, **characterized in that** the means for operating the spring loaded contacts are situated at the bottom of the nest portion in the corner defined by the bottom and the inner side wall of the nest portion, the outer wall of the side wall being towards the connection portion.
6. A luminaire socket outlet according to any one of the preceding claims 1 to 5, **characterized in that** the holes adapted to receive the installation wires are arranged on the same side of the luminaire socket

outlet body.

7. A luminaire socket outlet according to any one of the preceding claims 1 to 6, **characterized in that** the luminaire socket outlet body comprises holes for receiving line wire, neutral wire and ground wire. 5
8. A luminaire socket outlet according to any one of the preceding claims 1 to 6, **characterized in that** the luminaire socket outlet body comprises holes for receiving two line wires, two neutral wires and two ground wires for chaining the installation. 10
9. A luminaire socket outlet according to any one of the preceding claims 1 to 8, **characterized in that** the luminaire socket outlet is DCL compatible socket. 15

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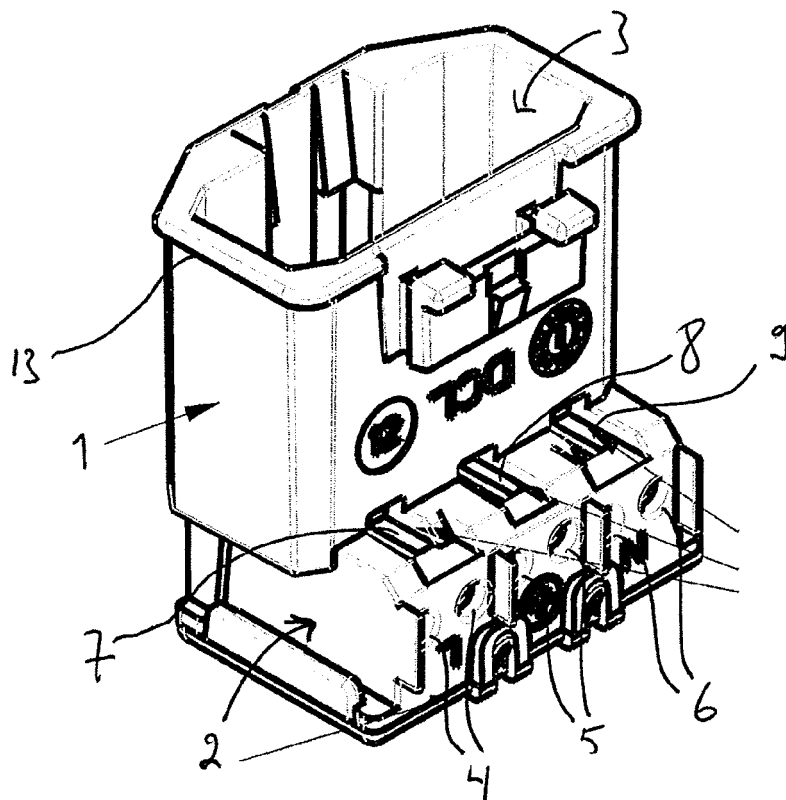


FIG 1

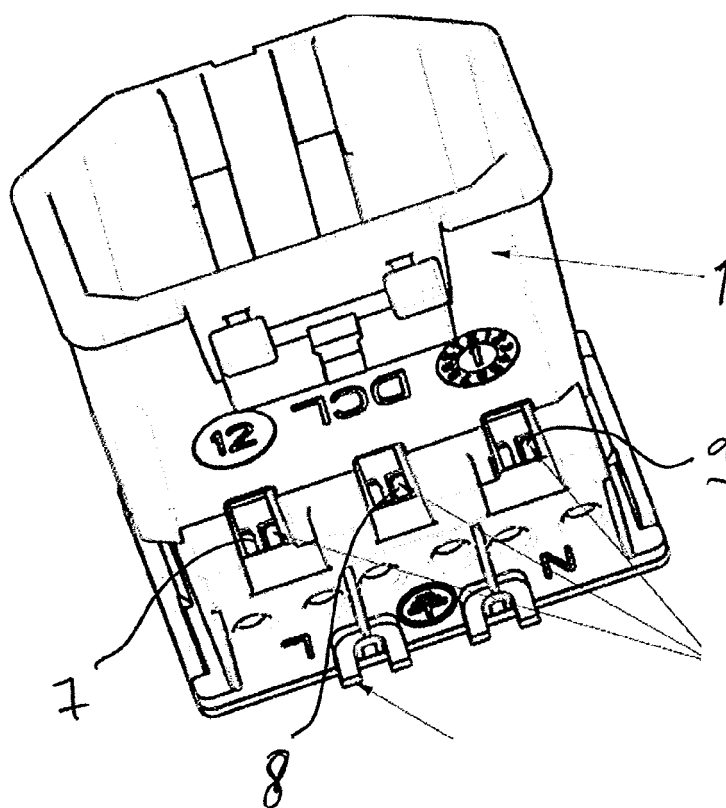


FIG 3

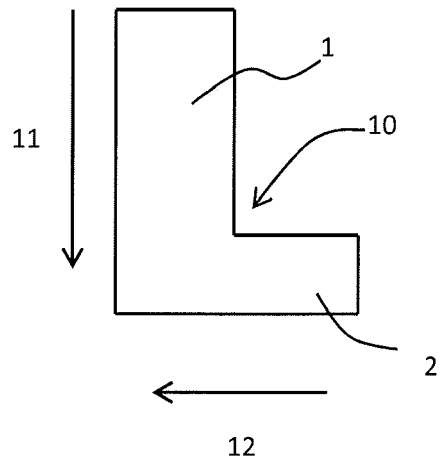


FIG 2

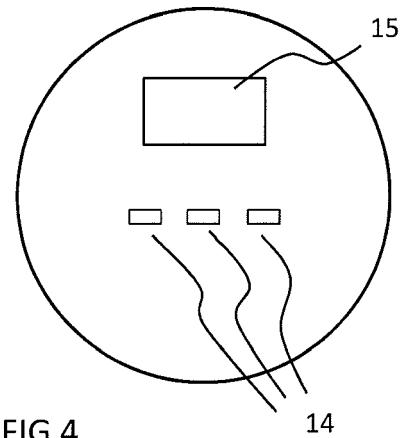


FIG 4

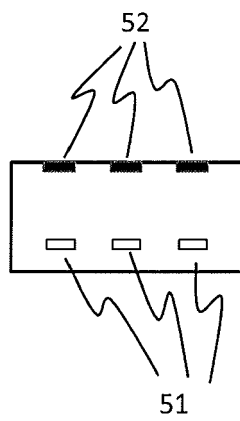


FIG 5



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 7419

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	WO 2011/064640 A1 (PANASONIC ELEC WORKS CO LTD [JP]; KATO KAZUHIRO [JP]; UENO SATORU [JP]) 3 June 2011 (2011-06-03) * figure 2 *	1	
A	WO 2011/099863 A1 (OPTIME AS [NO]; HANSEN EDGAR [NO]) 18 August 2011 (2011-08-18) * figures 5-7 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R F21V
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 October 2012	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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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