

ELECTRICAL POWER DISTRIBUTION DEVICE

Field of the invention

5 This invention relates to a device for distributing electrical power. In particular, the invention relates to a housing for receiving and maintaining electrical contact with an adaptor for providing electrical power. More particularly, but not exclusively, the present invention relates to an elongate housing that is capable of allowing an adaptor to tap off electrical power anywhere along the length of the housing, thus allowing the adaptor to provide
10 electrical power to any appliance that requires it.

Background of the invention

Conventional electrical power distribution systems are provided by power points which are
15 typically installed in a wall cavity or a surface mounted power outlet at predetermined locations, typically locations where power supply is needed. The locations of such power points to be chosen in advance and often subsequent requirements can mean that the power points are provided in the wrong location and/or in insufficient numbers.

20 Also, in common practice, a single power point may serve multiple appliances with an extension gang of sockets via a single plug inserted into the socket. This may be worsened by the construction of some inferior extension gangs in which the sockets' electrical points inside the gang housing are connected in series by wires of even smaller gauges. As the plug's electrical conduit to the extension gang may be a cord which gauge may typically be that of a
25 single appliance, and that multiple appliances plugged into the extension gang may be used simultaneously, the load may therefore exceed the given current load, thereby causing overloading of the cord which may overheat, melt or burn as a result. To mitigate the risk of overheating of serially connected wires of the gang sockets, some sockets extension gang provides for parallel bus bars or strips of electrical conductors running through the gang from
30 which each of the extension sockets may tap off power therefrom. It should be noted however that the electrical current would still be limited by the cord by which power is tapped off the mains socket via the plug.

It would be advantageous to solve this last "weak link" of cords by enabling the bus bar or electrical conductor strips to be connected directed to the power points. To this end, the housing for such extension sockets or tap off distribution must be enabled for such connection and mounting over the mains power supply point. One such extension apparatus available in the market is a housing that encloses a single track that is used for enclosing live, earth and neutral lines. The live and neutral lines are exposed but separated by space at the opposing sides of a single wide track encompassing all the live, earth and neutral lines. Tap off supply is achieved by providing novel adaptor with pins that would come into contact with the respective live and neutral lines by first plugging into the middle of the track to contact earth first before the plug is turned to enable the live and neutral pins to contact the respective live and neutral lines.

The disadvantages of this device includes having the live and neutral lines exposed throughout the track and separated by space (each at top and bottom end of the track cross section, or longitudinal sides of the track housing) rather than insulatively encased. There is also no predetermined number or positions of tap offs so a user may insert as many appliances' plugs into the groove or track as the entire track housing may accommodate. Thus, there is still a lack of load control and the danger of overloading persist in this apparatus. Moreover, the lack of predetermined positions and the nature of the slidable track means the tap-off units or plugs may be slidably moved along the track. If the appliance is in use or current is flowing such movement between electrical contacting surfaces will result in arcing and risk of the sparks igniting a fire.

In addition, in the device described above, the conductor for conducting earth is positioned in the middle of the track to contact earth is that the earth conductor. In such a configuration, the conductor is in the form of a resilient spring which is delicate and prone to damage as a result of wear and tear. Once damaged, the entire housing needs to be replaced. Also, with such a resilient conductor, considerable force is required to overcome the resilience when an adaptor is inserted into the housing to allow for engagement of the conductive parts of the adaptor with the earth conductor. This means engagement and usage is difficult.

Another power distribution apparatus attempts to solve the above problem of the resilient conductor by having all live, earth and neutral conductors positioned along a side of the apparatus for engagement with conductive parts of an adaptor. This results in a housing that is thick and cumbersome to manufacture and install.

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Further, in such conventional power distribution apparatuses, there is no cover over the opening of the apparatus to prevent dirt from entering and collecting within the tracks and electrical conductors. Also, without a cover, there may be instances where a user's finger may accidentally enter the apparatus and come into contact with an electrical conductor. While rubber flaps have been used as a cover, such rubber flaps have short lifespan and are prone to discolouration, thus affecting the aesthetics of the apparatus. In addition, such rubber flaps may disintegrate over time and break apart into smaller pieces. Such small pieces of the rubber flaps may get lodged in the apparatus causing the apparatus to malfunction.

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Hence, while there have been recent discussion and development of elongate electrical conductors, these conductors are relatively complex and difficult to manufacture, assemble and install, as well as occupy considerable volume of space for the current carrying capacity that is accommodated. Therefore, there is a need for an improved and safe electrical power distribution device.

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Summary of the invention

In accordance with a first preferred aspect of the present invention, there is provided a housing for receiving and maintaining electrical contact with an adaptor for providing electrical power, the housing comprising: (a) a first side and a second side, the first and second sides oppose each other; (b) an opening for receiving the adaptor, the opening intermediate the first and second sides; (c) a slot extending from the opening into the housing, the slot having a depth; (d) a first channel extending from the slot towards the first side, a second channel extending from the slot towards the second side, and a third channel extending from the slot towards the second side and above the second channel; and (e) each channel comprising an electrical conductor for engaging with a conductive member of the adaptor, wherein the first, second and third channels are perpendicular to the slot.

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Preferably, the first, second and third channels extend from the slot from different depths along the slot.

- 5 Preferably, the housing further comprising a fourth channel extending from the slot towards the first side and above the first channel, the fourth channel perpendicular to the slot and comprising an electrical for engagement with a conductive member of the adaptor.

10 Preferably, the first and fourth channels oppose the second and third channels in an offset manner.

Preferably, the housing is elongate and the opening, slot, channels and electrical conductors run longitudinally along the length of the elongate housing such that the housing provides electricity to the adaptor at any point along the length of the housing.

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Preferably, the distance of the channels from the slot towards the first and second sides are different.

20 Preferably, the third channel extends over the second channel and the fourth channel extends over the first channel.

Preferably, the electrical conductor has an engagement means for engaging and retaining the conductive member. More preferably, the engagement means is formed by folding the electrical conductor over itself to form a clip for clipping the conductive member.

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Preferably, the housing further comprising a cover for covering the opening. More preferably, the cover comprising a plurality of pairs of opposing panels, each pair of opposing panels are biased in the closed position by a resilient means and are pushed apart to an open position when the adaptor is inserted into the opening. The opposing panels are accommodated within the housing in first and second recesses adjacent the opening. The first recess extending from the slot towards the first side and the second recess extending from the slot towards the second side, wherein the first and second recesses oppose each other such that

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the opposing panels slide into the respective recesses when the opposing panels are pushed apart to an open position for insertion of the adaptor into the housing.

Preferably, the electrical conductor in each of the first, second and third channels are
5 connected to a main AC supply to conduct live, earth and neutral respectively.

Preferably, the electrical conductor in the fourth channel is connected to a main DC supply. Alternatively, or in addition to, the electrical conductor in the fourth channel is adapted to conduct data signals to, for example, support a network.

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Preferably, the housing further comprising at least one utility cavity.

Preferably, the housing is formed from a metal material. More preferably, the housing may be coated with any suitable material to protect it from the elements, increase its lifespan or
15 for aesthetic purposes.

Preferably, the slot and channels within the housing are formed from an insulating material. The insulating material may be plastic.

20 In accordance with a second preferred aspect of the present invention, there is provided an adaptor for use with a housing according to the first preferred aspect of the present invention.

In accordance with a third preferred aspect of the present invention, there is provided an adaptor for connection to and tapping off electrical power supply from a housing, the adaptor
25 comprising: (a) an axle protruding on a first side of the adaptor; (b) at least three arms extending perpendicularly from the axle and rotatable about a central axis of the axle in the same direction; (c) each rotatable arm comprising a conductive member for engagement with an electrical conductor in the housing to form an electrical connection when inserted into the housing; and (d) each of the conductive member is electrically connected to a second side of
30 the adaptor to provide a power outlet, the first and second sides oppose each other, wherein two arms extend from one side of the axle, and one arm extends from the opposite side of the axle, and the rotatable arms rotate between a first position in which the conductive

members are arranged for insertion into the housing, and a second position in which the conductive members are arranged to engage with the electrical conductors.

Preferably, each arm having a central axis that offsets each other.

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Preferably, the number and profile of the rotatable arms correspond to the interior of the housing to allow a fit between the adaptor and the housing when the conductive members are engaged with the electrical conductors.

10 Preferably, the three conductive members correspond to electrical conductors in the housing to conduct live, earth and neutral respectively.

Preferably, the adaptor further comprising a fourth arm having a conductive member located at the end of the arm, the fourth arm has a central axis that offsets the central axes of the
15 other three arms.

Preferably, the adaptor has a protective casing for accommodating the rotatable arms when the rotatable arms are in the first position.

20 Preferably, the adaptor has an indicator on the second side of the adaptor for indicating a live electrical connection between the conductive members of the adaptor and the electrical conductors of the housing.

Brief Description of Figures

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In order that the present invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative examples only preferred embodiments of the present invention, the description being with reference to the accompanying illustrative figures.

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In the Figures:

Figure 1 is a perspective view of a housing according to an embodiment of the present invention;

5 Figure 2 is another perspective view of a housing according to an embodiment of the present invention;

Figure 3 is a perspective view of a housing with an adaptor engaged to it according to an embodiment of the present invention;

10 Figure 4 is a cross section of a housing according to an embodiment of the present invention;

Figure 5 is a side view of an adaptor in a second position according to an embodiment of the present invention;

15 Figures 6A and B are top and bottom views of an adaptor according to an embodiment of the present invention;

Figures 7A and 7B is an exploded view of an adaptor in first and second positions according to an embodiment of the present invention; and

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Figure 8 is an exploded view of an adaptor in first and second positions according to an embodiment of the present invention.

Detailed Description of The Preferred Embodiments

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The present invention comprises broadly of two parts: a housing 5 and an adaptor 10 for use with the housing 5. Figures 1, 2 and 3 show perspective views of the housing 5. In particular, Figure 3 shows the housing 5 when an adaptor 10 is engaged with the housing 5. The housing 5 receives and maintains electrical contact with the adaptor 10 for providing electrical power, 30 for example, to an appliance.

To better describe the housing 5, reference is made to Figure 4 which shows a cross section of the housing 5. The housing 5 may be a structure having a first side 15 and a second side 20, the first side 15 and second side 20 oppose each other. In an embodiment, the structure may be substantially rectangular in shape. This includes a substantially rectangular profile as shown in Figure 4, as well as a substantially rectangular elongate shape as shown in the perspective views. An opening 25 in the housing 5 allows for receiving the adaptor 10, the opening 25 is intermediate the first side 15 and the second side 20. In an embodiment of the invention, the opening 25 may be formed on a planar surface 30 of the housing 5 about midway between the first side 15 and the second side 20. In Figure 4, the opening 25 may be seen on the top side of the housing 5. However, it is understood that the opening 25 may be placed anywhere along the planar surface 30 of the housing 5. The opening 25 may be any hole, cut, or the like, that is made to the surface of the housing 5. In an embodiment, the housing 5 is elongate. As such, the opening 25 follows and extends along the length of the elongate housing 5. More of this will be described below.

The opening 25 extends into the housing 5 in the form of a slot 35 which, in turn, is connected to a plurality of channels within the housing 5. As shown in the Figure 4, the opening 25 and slot 35 may be integral to each other. The slot 35 extends into the housing 5 in a downward direction as shown in an embodiment of the invention. It is understood that such orientation are relative depending on the perspective of the housing 5 shown. Also, the slot 35 has a depth – from the opening 25 to the end opposite the opening 25. The slot 35 may extend all the way down to the bottom of the housing 5 opposite the opening 25, or it may extend part of the way. In an embodiment of the present invention, there are three channels that extend from the slot 35: a first channel 40 that extends from the slot 35 towards the first side 15, a second channel 45 that extends from the slot 35 towards the second side 20; and a third channel 50 that extends from the slot 35 towards the second side 20 and above the second channel 45. Each channel 40, 45, 50 is perpendicular to the slot 35 and has an electrical conductor 55 to allow for an electrical engagement with a conductive member 100 of the adaptor 10. The adaptor 10 will be described in detail later below.

In a preferred embodiment of the present invention, the first 40, second 45 and third 50 channels extend from the slot 35 from different depths along the slot. The first channel 40

extends from the slot 35 at its deepest position nearest the portion of the housing that is furthest away from the opening 25. This is followed by second 45 and third 50 channels. In other words, while the first channel 40 and second channel 45 extend towards opposite sides of the housing 15, 20, they each have a central axis that offsets each other. While both first 40 and second 45 channels extend from the slot 35 in opposite directions, they do not directly oppose or face each other – they offset each other or are staggered in arrangement. The first 40 and second 45 channel openings along the slot 35 are not in a same plane, said plane being perpendicular to the slot 35. As shown in the cross section of the housing 5 in Figure 4, first channel 40 resides within the housing 5 at a depth that is lower than that of the second channel 45.

In an alternative embodiment of the present invention, a fourth channel 60 extends from the slot 35 towards the first side 15 and above the first channel 40. As with the other channels, the fourth channel 60 is perpendicular to the slot 35 and includes an electrical conductor 55 to allow for an electrical engagement with a conductive member of the adaptor 10. The first 40 and fourth 60 channels oppose the second 45 and third 50 channels in an offset manner. The third 50 and fourth 60 channels each have a central axis that offsets each other. Again, as shown in the cross section of the housing 5 in Figure 4, first 40 and fourth 60 channels are opposite second 45 and third 50 channels in an offset asymmetrical fashion. Generally, the first 40 and fourth 60 channels reside within the housing 5 at depths that are lower than that of the corresponding second 45 and third 50 channels. In other words, first 40 and fourth 60 channels on the first side 15 of the housing 5, and second 45 and third 50 channels on the second side 20 of the housing 5 all have a central axes that are not on the same plane. The openings of all the channels 40, 45, 50, 60 along the slot 35 are not in a same plane, said plane being perpendicular to the slot 35.

In addition to the varying depths of the channels 40, 45, 50, 60 that extend from the slot 35 within the housing 5, the distance of the channels 40, 45, 50, 60 from the slot 35 towards the first side 15 and second side 20 are different. As shown in the Figures, and in an embodiment of the present invention, the third channel 50 extends over and beyond the second channel 45, and the fourth channel 60 extends over and beyond the first channel 40.

The configuration, geometry and profile of opening 25, slot 35 and channels 40, 45, 50, 60 match and correspond to a portion of the adaptor 10 such that the housing 5 can receive and maintain electrical contact with the adaptor 10 for providing electrical power. In particular, portions of the adaptor 10 that include conductive members 100 for engagement with the
5 respective electrical conductors 55 match and correspond to the configuration and profile of opening 25, slot 35 and channels 40, 45, 50, 60. These will be described below.

The electrical conductor 55 are separately insulated within the channels 40, 45, 50, 60. The electrical conductor 55 in the first 40, second 45 and third 50 channels conducts are
10 connected to a main AC supply to conduct live, earth and neutral respectively. This in turn provides the respective live, earth and neutral supply for conduction of AC power to the adaptor 10 in the form of an outlet when the adaptor 10 is engaged with the housing 5. A grounding end terminal placed at the end of the housing 5 may be used to terminate the electrical conductors 55 and connects them to conventional electrical cables. Such terminal
15 can act as a grounding, thus insulate the ends of the electrical conductors 55 and prevents access by a user for safety reasons. It can also act as a connector between housings and/or secures the tracks (slot 35 and channels 40, 45, 50, 60) to the housing 5.

The electrical conductor 55 may be made of any good electrical conducting metal such as
20 copper and may include an engagement means for engaging and retaining the conductive member of the adaptor 10. The engagement means is formed by folding the electrical conductor over itself to form a clip for clipping the conductive member 100. The engagement means may be a U-shape cross-section profile of the electrical conductor 55 having a neck and a wide-tapered opening for securing the conductive member when it is inserted into the
25 housing 5. Other types of engagement means may include any type of jaws to provide a strong contact between the electrical conductor 55 and the conductive member.

In an embodiment of the present invention, the electrical conductor 55 in the fourth channel 60 is connected to a main DC supply. In addition or alternatively, the electrical conductor 55
30 in the fourth channel 60 may be adapted to conduct data signals to, for example, support a network. Such network may be any power line communication system that may ride over existing electrical wiring.

The housing 5 may be elongate and the opening 25, slot 35, channels 40, 45, 50, 60 and electrical conductors 55 run longitudinally along the length of the elongate housing 5, as can be seen in Figure 1, such that the housing 5 provides electricity to the adaptor at any point along the length of the housing. As such, the housing 5 as a whole may be a long track that is able to provide electrical power to an adaptor at any position or point along the track. The elongated opening 25, slot 35, channels 40, 45, 50, 60, and electrical conductors 55 may all collectively be known as “tracks” for convenience. The housing 5 may be formed by a rigid elongate extruded material, for example plastic or aluminium extrusion. In the case of an aluminium extrusion, the housing 5 may be coated with insulation coating for protection against the environment. The housing 5 has an elongate opening 25 extending along its length L through which the adaptor(s) 10 are intended to be inserted for connection to the electrical conductors 55, as can be seen in Figure 3. This arrangement allows for tap off points for tapping off power anywhere along the length of the elongate housing 5. The electrical conductors 55 may be made from any suitable material, for example copper.

The housing 5 further comprises a first recess 65 and a second recess 70. Both first 65 and second 70 recesses are adjacent the opening such that the first recess 65 extends from the slot 35 towards the first side 15 and the second recess 70 extends from the slot 35 towards the second side 20. As shown in Figure 4, the first 65 and second 70 recesses oppose each other to accommodate the opposing panels 68a, b that act as a cover 68 for the opening 25. The cover 68 comprising a plurality of pairs of opposing panels 68a, b, each pair of opposing panels 68a, b are biased in the closed position (in the direction C) by a resilient means 63 and are pushed apart when the adaptor 10 is inserted into the opening. When the opposing panels 68a, b are pushed apart in the direction O (i.e. towards the respective first 15 and second 20 sides of the housing 5) by the adaptor 10, they slide into the respective recesses 65, 70 within the housing 5. Advantageously, the cover prevents dirt or any other foreign objects, including water or a user's finger, from entering the housing 5.

In addition, the housing 5 also comprises at least one utility cavity. In an embodiment of the present invention, the housing has two utility cavities 75, 80 – one on adjacent each side 15, 20 of the housing 5. The cavities 75, 80 may be used to house any suitable objects, for example

wire cables, various electrical or data cables to aid in the installation and implementation of the power track. The housing 5 may be mounted on a wall structure with any suitable means, for example screws or the like.

- 5 In an embodiment, the housing 5 is mounted on a wall structure such that the second side 20 is oriented facing up towards the ceiling of the room and the first side 15 is facing down towards the ground. In such an embodiment, the electrical conductor 55 in either second 45 or third 55 channel may be configured to conduct a Live connection. In a preferred embodiment, the electrical conductor 55 in the third 55 channel is configured to conduct a
- 10 Live connection; the electrical conductor 55 in the second 45 channel is configured to conduct a Neutral connection; the electrical conductor 55 in the fourth 60 channel is configured to be the Earth; and the electrical conductor 55 in the first 40 channel is configured to conduct a DC connection. Advantageously, the Live electrical conductor 55 in the third channel 50 is facing upwards and is unlikely or difficult to be accessed by a user, or the effect of any foreign
- 15 object (for example, water) that may enter the housing. Such foreign object will need to defy gravity in order to come into contact with the Live electrical connection making the housing a bit safer for use.

The slot 35 and channels 40, 45, 50, 60 within the housing may be formed from a material

20 that is different from the rest of the housing 5. For example, the slot 35 and channels 40, 45, 50, 60 may be formed from an insulating material such as plastic. Such a plastic core (for example) 78 may provide some form of an insulation between electrical conductors 55.

The opening 25 and slot 35 for receiving and allowing the adaptor 10 having conductive

25 members to be inserted and rotated to allow the mating of the conductive members with the electrical conductors 55 (these electrical conductors 55 for conducting live, earth and neutral to the adaptor 10) for tapping off distribution of electricity from the electrical conducting tracks.

30 As shown in Figures 5 to 7, the adaptor 10 has an axle 85 (for example, the axle 85 may be a central axle 85) protruding on a first bottom side 90 of the adaptor 10. At least three arms 95 extend from the central axle 85 and are rotatable about the central axle 85, rotatable about

an axis of the central axle 85 in the same direction. As shown in the Figures, the arms are substantially perpendicular to the axle 85. Each rotatable arm 95 corresponds to a channel 40, 45, 50, 60 within the housing 5, and each rotatable arm 95 has a conductive member 100 located at the end of the arm 95 for engagement with a corresponding electrical conductor 55 in the housing 5 to form an electrical connection. The conductive members 100 are electrically connected to another side of the adaptor 10 (for example, a top side 105) to provide a power outlet 110. This power outlet is shown in Figure 6A.

In an embodiment of the present invention, two arms 95 extend on one side of the axle 85, and one arm 95 extends on the opposite side of the axle 85, each arm 95 having a central axis that offsets each other – as shown in Figure 6. In another embodiment of the present invention, there are four arms 95 that extend from the axle 85: two arms 95 on opposite sides of the axle 85. All arms 95 have a central axis that offsets each other. The position, dimension, profile and configuration of the arms 95 correspond to channels 40, 45, 50, 60 in the housing 5 which, in turn, allows the conductive members 100 at the end of each arm 95 to engage the respective electrical conductors 55 in the channels 40, 45, 50, 60 to conduct live, earth and neutral (and, for example, the fourth data conductor) respectively.

In the embodiment where the adaptor has three arms 95, the three arms 95 and their respective conductive members 100 represent live, earth and neutral conductance with the respective electrical conductor 55 in first, second and third channels 40, 45, 50.

In the embodiment where the adaptor has four arms 95, the fourth arm 95 and its conductive member 100 engages with the electrical conductor 55 in fourth channel 60.

Each arm 95 has a central axis that offsets each other. The number, geometry and profile of the axle 85 and arms 95 correspond to the interior of the housing 5 to allow a fit between the adaptor 10 and the housing 5 when the conductive members are engaged with the electrical conductors

The adapter 10 can be connected to the housing at any point along the elongate opening 25 by being pushed in and rotated such that the arms 95 rotate between a first position in which

the conductive members are arranged to engage with the electrical conductor and a second position in which the conductive members are arranged to disengage from the electrical conductor.

5 When in use, the adapter 10 may be inserted into the opening 25, and the adapter 10 may be prevented from rotating until the arms 95 and channels 40, 45, 50, 60 are aligned. This “lock and key” configuration provides a safety mechanism to ensure that the adapter 10 is firmly inserted in the corrected orientation before it may be rotated from a first position in which the conductive members 100 are arranged for insertion into the opening 25 and to fit the slot
10 35 of the housing 5, to a second position in which the conductive members 100 are correctly arranged to engage with the correct corresponding electrical conductor 55. As such, advantageously, the present invention prevents accidental connection of the conductive members 100 with the electrical conductors 55.

15 The adaptor 10 has a protective casing 108 for accommodating the rotatable arms 95 when the rotatable arms 95 are in the second position. When the adaptor 10 is inserted into the housing 5, it is this protective casing 108 that is inserted into the opening 25 and slot 35. Hence, the shape, dimension and configuration of the protective casing 105 allows for insertion in the elongate opening 25 and slot 35. The protective casing 108 also abuts the
20 arms 95 such that rotation in the opposite direction away from rotation that engages the electrical conductors 55 is not allowed. Hence, the protective casing 108 has openings that allow the arms 95 to rotate such that they match and fit the channels 40, 45, 50, 60.

The adaptor 10 may be held in place by the tension of the switch mechanism. A certain
25 amount of force is require to trip the switch between on/off positions. After tripping, the switch to the off position, the adaptor can then be disengaged.

The adaptor 10 has a switching mechanism operable to connect or disconnect the conductive members 100 to the electrical conductors 55 in response to the rotation of the arms 95. In an
30 embodiment, the switching mechanism includes an actuating member to allow for the rotation. An indicator on the second side of the adaptor for indicating a live electrical connection between the adaptor and the housing.

The adaptor 10 is described as any suitable tap off point of a typical power track bus bar system, such as the present invention. It is an electro-mechanical device which engages an electrical connection in parallel to the bus bars and adapts the conductive arrangement into an AC power socket. Operation of the adaptor involves aligning the longitudinal side of the stator to the opening 25 of the track housing 5, pushing it fully into the opening 25 and slot 35 and turning the adaptor 10 clockwise into the 'ON' position. Disengagement will be the same steps in reverse order. Figure 7A shows the adaptor 10 in a first position where the arms 95 and conductive members 100 are enclosed in a protective casing 105. This configuration allows the adaptor 10 (or at least the parts of the adaptor 10 – axle 85, arms 95, conductive members 100 and protective casing 105) to be inserted into the opening 25 and slot 35 of the housing 5. Once inside, the adaptor 10 may be rotated to release the arms 95 and conductive members 100 from the protective casing 105 for engagement with the electrical conductors 55 positioned in the channels 40, 45, 50, 60. The arms 95 rotate into the channels 40, 45, 50, 60 allowing the conductive members 100 to be engaged with the electrical conductors 55. If the adaptor is not aligned in the slot properly, then rotation is not achieved – much like a lock-and-key access configuration. The length of the arms 95 and the position of the arms 95 along the axle 85 must match the depth of the slots from which the channels 40, 45, 50, 60 extend from the slot 35 and the distance from which these channels extend towards the respective first 15 and second 20 sides of the housing 5, such that rotation is made possible.

The assembly of the adaptor 10 consists of four major parts: Stator 120, Adaptor Base 125, Switching Mechanism 130 and Adaptor Top Cap 140. The primary role of the Stator 120 is to align and sit the adaptor at the center of the slot 35 track and assist the rotation of the assembly. The secondary role is to provide a cavity to house the conductive members 100 and arms 95 when the adaptor 10 is removed from the track.

The Adaptor Base 125 houses the conductive members and arms, Switching Mechanism, electrical contacts for the socket and an electrical circuit that produces a light indicative of state of the Switching Mechanism. The conductive jaws are shaped in a fixed manner to reach the positions of all the bus bars in the 'ON' position.

The Switching Mechanism consists of a toggle, a toggle finger sitting on a spring and a metal bar which is located on a metallic fulcrum electrically connected to the 'Live' connector. When the adaptor is engaged into the 'ON' position by a clockwise turn, a vertical rod on the stator will travel in a fixed path that will push onto the toggle, swaying it right. This action causes the toggle finger to slide across the fulcrum and tilt the metal bar to be in contact with the socket, relaying to it the 'Live' connectivity. During disengagement, the anti-clockwise turn of the adaptor causes the vertical rod on the stator to reverse its path, pulling back the toggle swaying it left. This action causes the toggle finger to slide in the other direction, disconnecting the metal bar from the contacts of the socket. At the engaged state of the Switch Mechanism, the spring on the toggle finger maintains a mechanical pressure on the metal bar and locks the toggle in the 'ON' position. Due to the shape of the toggle, the vertical rod is also locked in position which in turn locks the stator position. A considerable amount of rotational force on the Adaptor is required to disengage the switching mechanism. This required amount of force is the keeps the adaptor in the 'ON' state while preventing unintended switching off of the socket.

The Adaptor Top Cap 140 covers the mechanism and socket conductors and is the face of the socket. It also houses the socket guard that shuts the pin holes when there is no appropriate plugs being connected.

The light ring 150 is a device made from clear plastic that acts as a light pipe to transfer the indicative lighting from the electrical circuit and diffusing it to the circumference of the adaptor.

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention.

Claims

1. A housing for receiving and maintaining electrical contact with an adaptor for providing electrical power, the housing comprising:
 - (a) a first side and a second side, the first and second sides oppose each other;
 - (b) an opening for receiving the adaptor, the opening intermediate the first and second sides;
 - (c) a slot extending from the opening into the housing, the slot having a depth;
 - (d) a first channel extending from the slot towards the first side, a second channel extending from the slot towards the second side, and a third channel extending from the slot towards the second side and above the second channel; and
 - (e) each channel comprising an electrical conductor for engaging with a conductive member of the adaptor,wherein the first, second and third channels are perpendicular to the slot, the first and second channels extend towards opposite sides of the housing, each channel has a central axis that offsets each other in a staggered arrangement.
2. The housing according to claim 1, wherein the first, second and third channels extend from the slot from different depths along the slot.
3. The housing according to any one of claims 1 or 2, further comprising a fourth channel extending from the slot towards the first side and above the first channel, the fourth channel perpendicular to the slot and comprising an electrical conductor for engagement with a conductive member of the adaptor.
4. The housing according to claim 3, wherein the first and fourth channels oppose the second and third channels in an offset manner.
5. The housing according to any one of the preceding claims, wherein the housing is elongate and the opening, slot, channels and electrical conductors run longitudinally along

the length of the elongate housing such that the housing provides electricity to the adaptor at any point along the length of the housing.

6. The housing according to any one of the preceding claims, wherein the distance of the channels from the slot towards the first and second sides are different.

7. The housing according to claim 6, wherein the third channel extends over the second channel.

8. The housing according to claim 7, wherein the fourth channel extends over the first channel.

9. The housing according to any one of the preceding claims, wherein the electrical conductor has an engagement means for engaging and retaining the conductive member of the adaptor.

10. The housing according to claim 9, wherein the engagement means is formed by folding the electrical conductor over itself to form a clip for clipping the conductive member.

11. The housing according to any one of the preceding claims, further comprising a cover for covering the opening.

12. The housing according to claim 11, wherein the cover comprising a plurality of pairs of opposing panels, each pair of opposing panels are biased in the closed position by a resilient means and are pushed apart to an open position when the adaptor is inserted into the opening.

13. The housing according to claim 12, wherein the housing further comprising first and second recesses adjacent the opening, the first recess extending from the slot towards the

first side and the second recess extending from the slot towards the second side, wherein the first and second recesses oppose each other and accommodate the opposing panels such that the opposing panels slide into the respective recesses when the opposing panels are pushed apart to an open position for insertion of the adaptor into the housing.

14. The housing according to any one of the preceding claims, wherein the electrical conductor in each of the first, second and third channels are connected to a main AC supply to conduct live, earth and neutral respectively.

15. The housing according to any one of claims 3 to 14, wherein the electrical conductor in the fourth channel is connected to a main DC supply.

16. The housing according to any one of claims 3 to 14, wherein the electrical conductor in the fourth channel is adapted to conduct data signals to support a network.

17. The housing according to any one of the preceding claims, wherein the housing further comprising at least one utility cavity.

18. The housing according to any one of the preceding claims, wherein the housing is formed from a metal material.

19. The housing according to any one of the preceding claims, wherein the slot and channels within the housing are formed from an insulating material.

20. The housing according to claim 18, wherein the insulating material is plastic.

21. An adaptor for use with a housing according to any one of claims 1 to 20.

22. An adaptor for connection to and tapping off electrical power supply from a housing, the adaptor comprising:

- (a) an axle protruding on a first side of the adaptor;
- (b) at least three arms extending perpendicularly from the axle, the at least three arms are rotatable about a central axis of the axle in the same direction;
- (c) each rotatable arm comprising a conductive member for engagement with an electrical conductor in the housing to form an electrical connection when inserted into the housing; and
- (d) each of the conductive member is electrically connected to a second side of the adaptor to provide a power outlet, the first and second sides oppose each other,

wherein two arms extend from one side of the axle, and one arm extends from the opposite side of the axle, the two opposing arms each have a central axis that offsets each other in a staggered arrangement, and the rotatable arms rotate between a first position in which the conductive members are arranged for insertion into the housing, and a second position in which the conductive members are arranged to engage with the electrical conductors.

23. The adaptor according to claim 21, wherein each arm having a central axis that offsets each other.

24. The adaptor according to any one of claims 21 or 22, wherein the number and profile of the rotatable arms correspond to the interior of the housing to allow a fit between the adaptor and the housing when the conductive members are engaged with the electrical conductors.

25. The adaptor according to any one of claims 21 to 24, wherein the three conductive members correspond to electrical conductors in the housing to conduct live, earth and neutral respectively.

26. The adaptor according to any one of claims 21 to 25, further comprising a fourth arm having a conductive member located at the end of the arm, the fourth arm has a central axis that offsets the central axes of the other three arms.

27. The adaptor according to any one of claims 21 to 26, further comprising a protective casing for accommodating the rotatable arms when the rotatable arms are in the first position.

28. The adaptor according to any one of claims 21 to 27, further comprising an indicator on the second side of the adaptor for indicating a live electrical connection between the conductive members of the adaptor and the electrical conductors of the housing.